

**Elliott Bay Nearshore Substrate Enhancement
Project Monitoring Report:
evaluation of utilization of substrate diversity and
production of prey taxa important to juvenile
salmonids in 1998 and 1999**

Prepared for the
Elliott Bay/Duwamish Restoration Program Panel
by

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1. Introduction

Project Description

The Elliott Bay Nearshore Substrate Enhancement Project was undertaken by the Elliott Bay/Duwamish Restoration Program Panel (Panel) in March 1998 at selected sites northeast of Duwamish Head on Washington Department of Natural Resources (WDNR) property and seaward of Seattle tidelands north of Seacrest Park in West Seattle. The King County Department of Natural Resources (King Co, DNR) was selected as project manager subsequent to site investigations by the Washington Department of Fish and Wildlife (WDFW) in 1996. The Panel's Habitat Development Technical Working Group provided guidance during the project design phase and in the development of the monitoring plan.¹

Four materials (cobble, quarry spall, pea gravel and oyster shell) were placed in eight plots (four plots each at two sites) to enhance productivity of benthic infauna, increase the distribution and density of macroalgae and other primary producers, and improve the attributes that support resident and migratory marine and estuarine fish species (Figure 1).

Specific objectives were identified as follows:

- ❖ Increase diversity of bottom substrates
- ❖ Increase area of limiting hard bottom substrates
- ❖ Provide intertidal substrates for bait fish spawning
- ❖ Provide suitable substrates at proper horizons for eelgrass
- ❖ Increase volume of physical and protective structures for juvenile and adult resident invertebrates and fishes
- ❖ Increase hard structure surfaces for macroalgae
- ❖ Remove undesirable bottom debris

¹ Elliott Bay Nearshore Substrate Enhancement Monitoring Plan. May 2000. Elliott Bay/Duwamish Restoration Program Panel Publication No.25

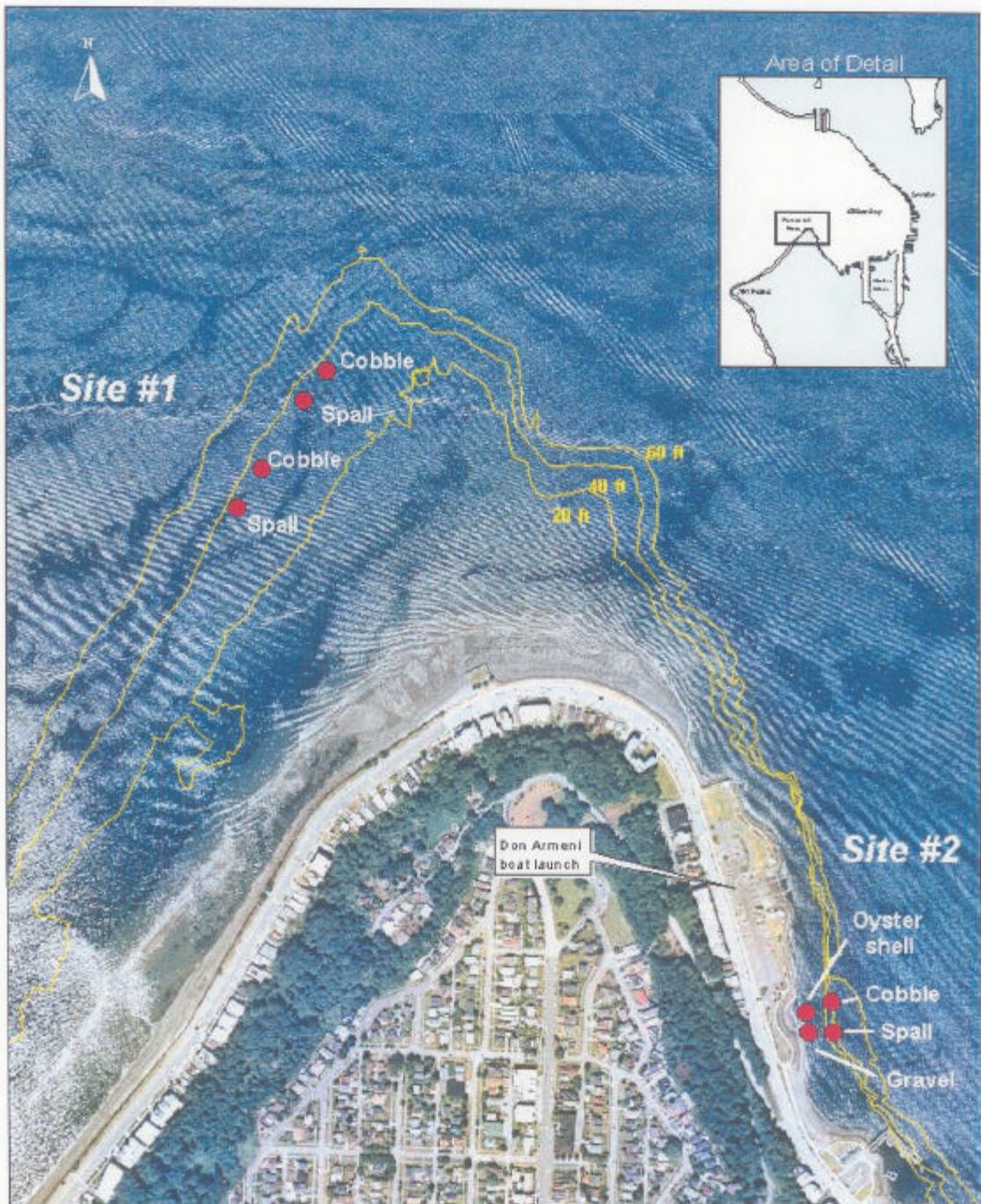


Figure 1. Elliott Bay Nearshore Substrate Enhancement Project Location

Condition Prior to Substrate Enhancement Project

Duwamish Head (Site #1)

Pursuant to field investigations conducted by WDFW under contract to the Panel, the substrate was described as sand, mixed fine (Buckley, undated). In addition to patches of eelgrass, the presence of large macrophytes at relatively deep depths at Duwamish Head was recorded. A checklist of species found at the site is provided in Appendix A. WDFW divers determined that

"The apparent stability of the substrate in the area (based on probe penetration depths and habitat specificity of the species of infauna) indicates limited, if any, need for engineering analyses for construction; patches of high biodiversity created by the limited rock substrates and the currents caused by tidal exchanges all indicate a high potential for a significant increase in the biodiversity and densities of species in the Elliott Bay area resulting from benthic habitat enhancement [at] Duwamish Head."

(Buckley, April - May 1996 Progress Report).

Seacrest Park (Site #2)

Based on field investigations, WDFW advised the Panel that the subtidal area in the vicinity of Seacrest Marina reflected a favorable physical profile and potential for high biodiversity. Bottom contours indicated a variably sloping substrate with some shelf areas. Substrate was described as sand, mixed fine, mixed coarse, gravel, silty gravel, gravel-sand-silt mixture; gravel sand mixtures, organic silts and organic silty clays of low plasticity; clayey sand, sandy-clay mixtures; well-graded sands and gravelly sands, little or no fines. A checklist of species identified in the area is provided in Appendix A. (Buckley and Bookheim, December - March 1996 Progress Report)

Project Design and Implementation

The substrate materials used were chosen based upon their likelihood of achieving project goals. The larger materials, cobble and quarry spall, were chosen to increase the

substrate and surface area for macroalgae attachment as well as provide cover for fish and invertebrates. The oyster shell was chosen to provide habitat for juvenile Dungeness crab specifically. The pea gravel was selected to provide habitat for juvenile salmonid prey.

Approximately 40 cubic yards of materials were placed by barge and crane in eight plots in March 1998. A description of the plot configuration at each site is provided below (see Figure 1 for location).

Duwamish Head (Site #1)

Two plots of cobble and two plots of quarry spall were placed near the -35 feet (ft) mean lower low water (MLLW) bathymetric contour at this site. Each plot was composed of approximately five cubic yards and measured approximately 10 ft x 10 ft. All plots were less than 18 inches (in.) high.

Seacrest area (Site #2)

Approximately one five cubic yard plot of pea gravel and one five cubic yard plot of oyster shell were placed at depths from -2 ft to -12 ft MLLW. The oyster shell plot measured approximately 10 ft by 20 ft, with a shell layer depth of about 6 inches. The pea gravel plot also measured approximately 10 ft by 20 ft.

One plot of quarry spall and one plot of cobble, each about five cubic yards and approximately 10 ft by 10 ft, were placed near the -35 ft MLLW bathymetric contour. Each plot contained rocks ranging in size from 2 to 12 in., with an average 12 in. thickness and height less than 18 in.

2. Monitoring Schedule, Tasks, and Methods

The Elliott Bay Nearshore Substrate Enhancement Monitoring Plan (May 2000) provides detailed descriptions of the project area and the monitoring tasks and methods. The monitoring of treatment and control areas provides for the post construction assessment of physical stability, productivity of benthic infauna, distribution and density of macroalgae and other primary producers, and improvement in

attributes that support resident and migratory marine and estuarine fish species.

Monitoring Schedule

Table 1 displays the monitoring dates for Sites #1 and #2 for years 1 and 2.

Physical observations of quarry spall, cobble, pea gravel and shell plots occur in years 1, 2, 3, 4, and 5.

For years 3 to 5, observations are to occur semi-annually in February or March and July or August, and more often as resources permit (Table 2).

Epibenthic invertebrate sampling of the gravel plot occurred in April 1998, May 1999, and April 2000. This report provides monitoring results for years 1 and 2 (1998 and 1999). Additional epibenthic invertebrate sampling is scheduled to occur in years 4 and 5 in both April and May if resources permit. Monitoring for the settlement of juvenile Dungeness crab in the oyster shell plot occurred in July and August 1998; no further sampling is scheduled.

Table 1. Project Monitoring Schedule: 1998 and 1999

	Date	Type of Monitoring	Substrate
Duwamish Head (site #1)	27-Feb-98	Video	all
	25-Mar-98	Video	2 piles closest to shore
	19-Jun-98	Video	all
	28-Jul-98	Video	all
	27-Mar-99	Video	all
	27-Aug-99	Video	all
Seacrest (site #2)	28-Feb-98	Video	all
	25-Mar-98	Video	all
	30-Apr-98	Epibenthic invertebrate sampling	gravel, sand (control)
	13-Jul-98	Video	all
	23-Jul-98	juv. Dungeness crab survey	oyster shell
	18-Aug-98	juv. Dungeness crab survey	oyster shell
	27-Mar-99	Video	all
	24-May-99	Epibenthic invertebrate sampling	gravel, sand (control)

Table 2. Five Year Monitoring Schedule: 1998-2002

	Type of Monitoring	Year Monitored	Frequency	Month (s)	Substrate
Duwamish Head (site #1)	Physical	Year 1 (1998)	Quarterly	February, March, June, July	all four plots
		Year 2-5 (1999-2002)	Semi-annual	February or March July or August	all four plots
Seacrest (site #2)	Physical	Year 1 (1998)	Quarterly	February, March, July *	all four plots
		Year 2-5 (1999-2002)	Semi-annual	February or March July or August	all four plots
	Biological juv. Dungeness crab survey salmonid prey survey	Year 1 (1998) Years 1-2 (1998,1999) Years 3-5 (2000-2002)	Annual Annual Semi-annual	July April or May April, June	oyster shell pea gravel pea gravel

* plots were not monitored in August

Tasks and Methods

Three post-construction monitoring tasks were used at site #2: physical observation, epibenthic invertebrate sampling, and juvenile Dungeness crab assessment. Physical observation was the only monitoring method employed at site #1.

Physical Observation: Physical observations of all plots at both sites were made by scuba divers and filmed using an underwater video camera (8-mm video tape). All plots were designated with ropes and/or floats to assist divers in locating the plots. Divers filmed the center of the plots as well as the perimeter. Observations were intended to assist in the assessment of sediment accumulation, fish presence, macroalgae presence, and the areal extent and configuration of substrate treatments.

Epibenthic invertebrate Sampling: Monitoring for production of invertebrate prey taxa known to be important to juvenile salmonids was conducted at Seacrest (site #2) for the pea gravel plot on April 30, 1998 and May 24, 1999. For each sampling event, five samples were collected from the pea gravel plot at an average tidal height of -22 MLLW. In

addition, five samples were collected from an untreated area adjacent to the pea gravel plot which served as a control plot. However, due to resource constraints, only three samples collected from each plot were analyzed.

Samples were collected with a gas powered centrifugal water pump, sucked through a 15 meter long (51 mm inner diameter) hose, connected to a cylinder 0.35 meter wide and 0.38 meter high (Figure 2). The sampling cylinder had ports covered with a 130 micron mesh net to minimize collection of extraneous material and allow water flow. The water in the cylinder was evacuated and all water entering the cylinder passed through the screened ports. The epibenthos was captured in the mesh net and then screened using a 253 microns sieve with rinse water. All rinse water was filtered to avoid sampling contamination. The organisms remaining on the sieve were then transferred to a sample container and preserved in a 10% buffered formalin solution (samples were later transferred to a 70% alcohol solution). To ensure siting of the pump head, an underwater video camera was mounted so that a "live" image of the substrate could be monitored as samples were taken. A hand winch was used to lower the head slowly with minimal disturbance to the substrate. The boat was anchored and moored from the bow and stern to ensure that the head remained stable on the sample substrate. The pump was operated long enough to move at least three times the volume of the entire system, approximately 30 seconds. The centrifugal pump system was developed at the University Of Washington School of Aquatic and Fishery Sciences (Simenstad et al. 1991).

Juvenile Dungeness Crab Assessment: Monitoring for juvenile Dungeness crab settlement was conducted at site #2 for the oyster shell plot only. For each sampling event, 10 samples were collected using a hand-held Venturi suction dredge within a 14 m² metal frame. Samples were sorted, identified, measured, and returned live. Ten samples were also collected from an eelgrass bed (northwest of the oyster shell plot) which served as a control site (see Dinnel and Hora for a detailed description of monitoring methods and results).



Figure 2. Epibenthic pump system

3. Monitoring Results

Site #1 - Duwamish head

Cobble and spall plots

The Duwamish Head project area (site #1) was monitored with 8-mm video in February 1998 prior to substrate

placement in March 1998. The pre-construction video showed the native substrate at site #1 was composed mostly of sand, with numerous orange sea pens in the area.

The first post-construction observations were made approximately two weeks following substrate placement (see Table 1 for monitoring dates). This video showed that benthic diatoms were covering the quarry spall and cobble at the two substrate plots placed closest to shore, particularly the spall plot which is the farthest south. The two northern plots were not videotaped because they could not be located by the divers conducting the monitoring.

A video survey was conducted in June; however, poor visibility made cataloging algae and organisms difficult.

The July 1999 monitoring observations detected several macroalgae species attached to the substrates on all four plots. Several invertebrates, such as anemones, barnacles, sea stars, and shrimp were seen on or around the rocks. Heavy barnacle growth was noted at all plots. Fish, such as sculpins, sole, greenling, and juvenile rockfish were present as well. It appeared that wherever hard substrate was available, macroalgae and sessile invertebrates had attached.

The site was monitored again in August 1999 and showed significant microalgae growth at all the plots. Although a species and estimated abundance list has not been produced, there was more macroalgae growth noted during this survey than previous videos. Monitoring in March 1999 showed similar macroalgae and invertebrate species present in 1998. It was difficult to see the actual substrate plots due to the heavy macroalgae growth. Macroalgae had also attached to the ropes that were placed to guide the divers to the substrate piles.

Site #2 - Seacrest Area

Quarry Spall and Cobble Plots

The quarry spall and cobble plots at site #2 were monitored in February 1998, two weeks following substrate placement. Although the cobble and spall plots were bare,

the oyster shell was heavily covered with benthic diatoms. Diatom growth was detected in the gravel plot; however, it was not as easily distinguishable as on the oyster shell. Scheduling conflicts precluded the plots being monitored in June.

The July monitoring observations documented that macroalgae species had attached to the cobble and spall plots. Barnacles had settled on the larger rocks and many types of invertebrates were seen on or in between all the substrates. Several small fish, including perch and juvenile rockfish, were seen around the oyster shell plot, along with macroalgae. The macroalgae on the oyster shell was composed mainly of the green alga, *Ulva spp.* The gravel showed diatom growth but other organisms were hard to distinguish. Although not reflected in the video, divers conducting the monitoring reported seeing several shrimp among the substrates.

The March 1999 monitoring showed similar macroalgae and invertebrate species present as observed in post-construction monitoring in 1998. The gravel plot appeared to have eroded slightly and had dispersed down the slope.

Site #2 Pea Gravel Treatment Biological Success

Detailed lists of 1998 and 1999 epibenthic fauna results are provided in Appendices B and C, respectively. Monitoring for both 1998 and 1999 reflected the presence of important prey fauna for many juvenile stages of Puget Sound fish. Table 3 shows juvenile fish prey present in the gravel and control plots in 1998 and 1999.

Table 3. Juvenile Fish Prey Results for 1998 and 1999
 (mean densities No./m²)

	Pea gravel plot		Control plot	
	1998	1999	1998	1999
Juvenile Salmonid Prey				
<i>Harpacticus</i> copepodids	13.3	0	0	0
<i>Harpacticus compressus</i>	13.3	0	0	0
<i>Zaus</i> spp.	53.3	0	16.7	6.7
<i>Tisbe</i> spp.	1560	8070	2510	3303.3
<i>Dactylopusia vulgaris</i>	2346.7	12000	9173.3	843.3
<i>Dactylopusia crassipes</i>	0	0	33.3	0
<i>Cumella vulgaris</i>	26.7	3.3	80	6.7
Chironomidae larvae	0	0	3.3	0
Total:	4,013	20,073	11,817	4,160
Other Juvenile Fish Prey				
<i>Longipedia</i> sp.	0	0	13.3	0
Ectinosomatidae	586.7	66.7	1090	86.7
<i>Harpacticus obscurus</i> grp.	213.3	66.7	273.3	90
<i>Amphiascopis cinctus</i>	80	73.3	63.3	13.3
<i>Amphiascoides</i> sp.	26.7	0	0	0
<i>Aoroides</i> sp.	30	130	180	6.7
<i>Pontogeneia</i> cf. <i>Rostrata</i>	110	63.3	153.3	10
<i>Ischyrocerus</i> sp.	26.7	140	13.3	16.7
Caprellidae	0	3.3	20	3.3
Total:	1,073	543	1,807	227

Harpacticoid copepods, *Harpacticus uniremis* and *Tisbe* spp., were found in both the gravel and control plots in 1998 and 1999. *Harpacticus* spp. were found at similar densities for both the gravel and control plots in 1998 and also in 1999. Other harpacticoid copepods, *Zaus* spp. and *Dactylopusia* spp., were also found at both plots. *Zaus* spp. were found in low densities for both plots in 1998 and in the control plot in 1999, but were not found in the gravel plot for 1999. Two cumaceans, *Cumella vulgaris* and *Lamprops quadriplicata*, were found in low densities (less than a mean of 28/m²) at both plots in 1998 and 1999. However, *Lamprops quadriplicata* was only seen in the gravel plot in 1999 at a low mean density of 3.3 /m².

Figure 3 displays densities of harpacticoid copepods, gammarid amphipods, and total epibenthos for samples collected in 1998 and 1999. Results show higher overall abundance for the gravel plot in 1999 than in 1998 and an

increase in total harpacticoid abundance in 1999. This is due primarily to higher numbers of two harpacticoid copepod species found in the gravel plot in 1999: *Dactylopusia vulgaris* and *Tisbe* spp. *Dactylopusia vulgaris* had a mean density (No./m²) of 2,347 in 1998 compared to 12,000 in 1999. Likewise, *Tisbe* spp. had a mean density (No./m²) of 1,560 in 1998 compared to 8,070 in 1999.

The control plot shows the opposite of the gravel with a decrease in overall abundance and total harpacticoid abundance for 1999. This decrease is largely due to fewer numbers of *Dactylopusia vulgaris* found in 1999. For *Dactylopusia vulgaris*, a mean density (No./m²) of 9,173 was found in 1998 compared to 843 in 1999.

Figure 4 presents densities of salmon prey taxa, other fish prey taxa, and non-prey taxa for the samples collected in 1998 and 1999. In general, results reflect higher density increases for salmonid prey harpacticoid copepods in the gravel plot in 1999 than were observed in 1998, one month after project implementation. As stated above, this is due to increases in *Dactylopusia vulgaris* and *Tisbe* spp., which are both known to be juvenile salmonid prey.

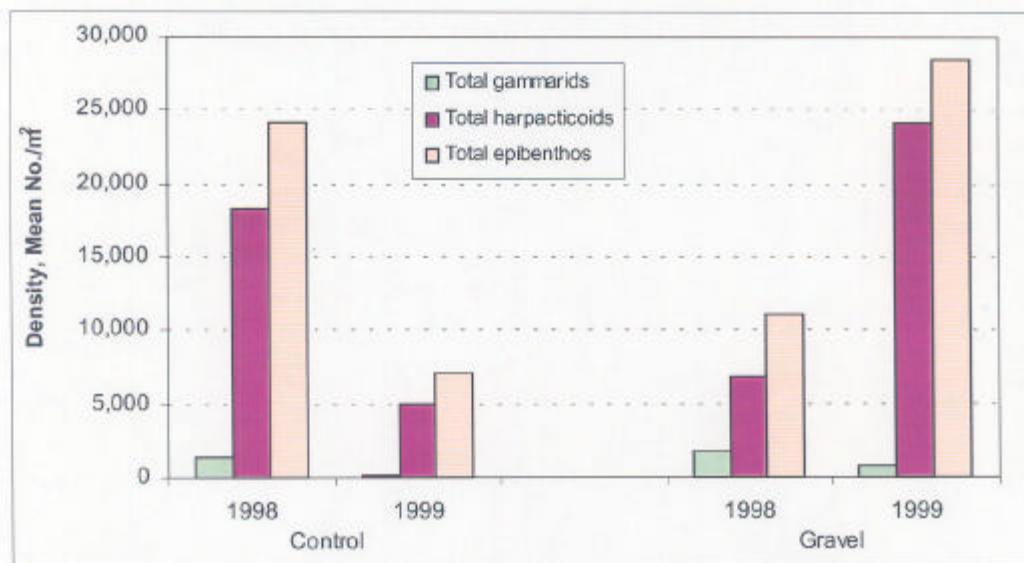


Figure 3. Abundance of gammarid amphipods and harpacticoid copepods for the gravel and control plots at site #2 (Seacrest): 1998 and 1999.

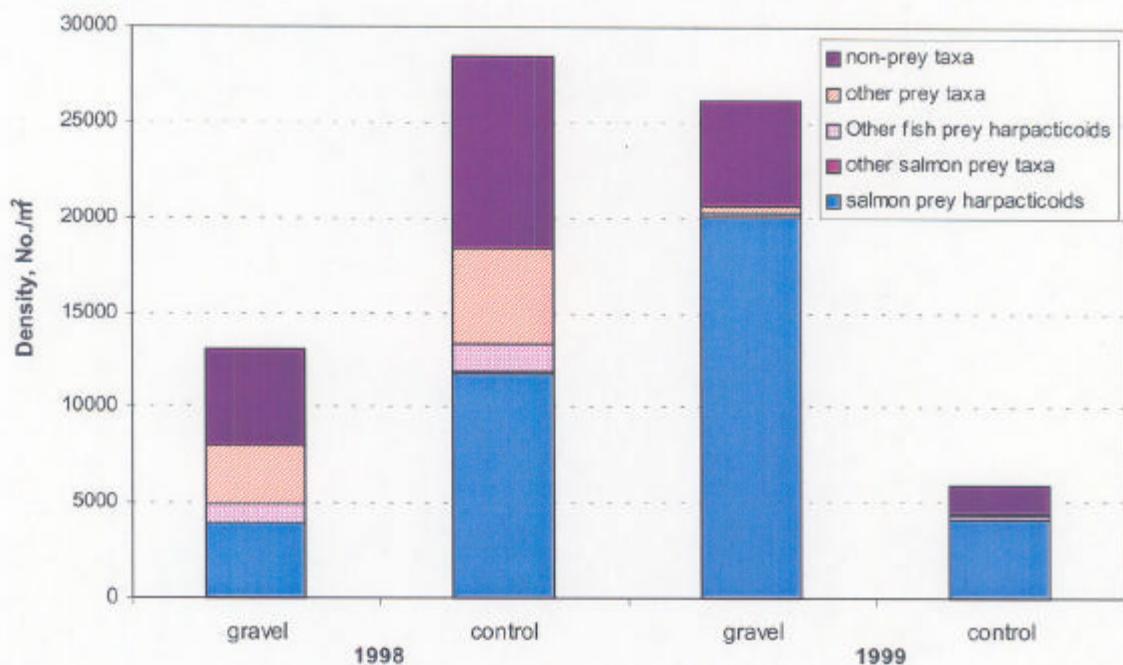


Figure 4. Abundance of salmonid and other fish Prey at site #2 (Seacrest): 1998 and 1999.

Site #2 - Oyster Shell Plot Biological Success

The oyster shell plot at Site #2 and the "control" eelgrass area near Duwamish Head were sampled twice during July and August 1998 for the presence of juvenile Dungeness crab, *Cancer magister*. Although no settlement of juvenile Dungeness crab was detected in the oyster shell plot, other crab species, fish and invertebrate fauna were present. Low densities of juvenile Dungeness crab were found in the control eelgrass bed. Monitoring methods and results are provided in a report produced by the Panel in November 1998 (Dinnel and Hora, 1998).

4. Discussion

Although detailed species list and estimated algae and/or invertebrate abundance have yet to be produced, the video monitoring shows the materials placed at both sites were effective for providing macroalgae and sessile invertebrate attachment sites. The macroalgae is providing cover for several fish species, including sole and rockfish. The macroalgae, and the substrates themselves, are also providing cover for many invertebrates, such as crabs and shrimp.

The effectiveness of the pea gravel application cannot be determined conclusively due to the limited number of samples and inherent high variability between samples and years for epibenthic fauna. Thus, it is not possible to detect statistically significant differences between the gravel and control epibenthic assemblages. However, general observations suggest that the overall abundance of epibenthic invertebrates, including juvenile salmonid prey taxa, increased in 1999 when compared to the 1998 results.

Harpacticoid copepods, *Harpacticus uniremis* and *Tisbe spp.*, are especially prominent in the diet of juvenile salmonids (Simenstad et al. 1979, 1988). *Tisbe spp.* was found in both the gravel and control plots in 1998 and 1999. Juvenile chum and pink salmon, Pacific herring, surf smelt, Pacific sand lance, and three spine stickleback have been found to feed heavily on *Tisbe spp.*, *Zaus spp.*, *Harpacticus spp.*, and *Dactylopusia spp.* (Simenstad et al 1979, 1988,

1991; Sibert 1979; Healey 1979; Landingham 1983, from Groot and Margolis 1991). Representatives from each genus identified above were found in both plots. Cumaceans (*Cumella vulgaris* and *Lamprops quadriplicata*) are prey of juvenile chinook and coho salmon (Simenstad et al. 1988). *Cumella vulgaris* was found in low densities at both plots in 1998 and 1999, but *Lamprops quadriplicata* was only seen in the gravel plot in 1999 at a low density.

Impacts of substrate modification are often complicated by different responses of the taxa at different times and sites. Simenstad et al (1991) reported varying impacts in their study of gravel application to intertidal mud and sand substrates in two embayments in Hood Canal and south Puget Sound: Bywater Bay and Oakland Bay. Cumaceans and several other taxa were depressed relative to untreated sites on sandflats of Bywater Bay, while *Tisbe spp.* and *Zaus sp.* were strongly enhanced. Their mudflat site at Oakland Bay showed contrasting results, with enhanced numbers across most taxa. Whether or not the epibenthic assemblages at this project site follow either of these two patterns is not yet known.

The oyster shell plot at site #2 does not appear to be effective for providing habitat for juvenile Dungeness crab. Although the shell plot was only sampled during the first year, no Dungeness crab were found and only a small number were found in the control plot. Factors limiting larvae settlement may have included overall low abundance of Dungeness larvae in Elliot Bay in 1998 and the depth of the oyster shell plot. Although the oyster shell plot did not attract Dungeness crab, the plot did provide complex habitat for other crab species, invertebrates, and small fish (Dinnel and Hora).

5. Recommendations

Video surveys of all plots should continue.

Sampling activities in years 3 to 5 should be conducted in the same month as occurred in the year 1999 (May).

Vertical migration of the oyster shell and gravel plot needs to be assessed. It is possible that this could be accomplished by placing markers at the end of the current plots and measuring migration for subsequent surveys.

A detailed species list, including estimated abundance, needs to be produced for every video survey. The data should be entered into a database, possibly an Excel spreadsheet, for analysis.

To aid in the assessment of species diversity and abundance, densities in cobble and spall plots at Sites #1 and #2 should be estimated in addition to listing macroalgae and macro-invertebrates, fish numbers and species.

For more conclusive investigation on the functional use of the substrate modification by fish and epibenthic crustaceans, the project might use fish and gut surveys in addition to further meiofauna collections taken with greater frequency in the late winter and spring. Cordell (1986) found species specific distribution curves through his study season, with *Harpacticus uniremis* having a single discrete peak of abundance, while *Tisbe spp.* had multiple peaks over an extended Spring period.

6. References

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Appendix A

Table A-1. Checklist of species found at Duwamish Head,
Site #1, 1996. (Buckley)

Table A-2. Checklist of species found at the Seacrest
nearshore area, Site #2, 1996. (Buckley and Bookheim)

Table A-1. Checklist of species found at Duwamish Head,
Site #1, 1996.

Fish	Echinodermata (continued)
Big skate (<i>Raja binoculata</i>)	Ochre sea star (<i>Pisaster brevispinus</i>)
Shiner perch (<i>Cymatogaster aggregata</i>)	California sea cucumber (<i>Parastichopus californicus</i>)
Puget Sound sculpin (<i>Artedius meanyi</i>)	White sea cucumber (<i>Eupentacta quinquesemita</i>)
Painted greenling (<i>Oxylebius pictus</i>)	Cnidaria
C-O sole (<i>Pleuronectes coenosus</i>)	White plumed anemone (<i>Metridium giganteum</i>)
Mollusca	Anemone (<i>Metridium senile</i>)
Gumboot chiton (<i>Cryptochiton stelleri</i>)	Painted anemone (<i>Urticina crassicornis</i>)
Lined chiton (<i>Tonicella lineata</i>)	Sand-rose anemone (<i>Urticina columbiana</i>)
Black chiton (<i>Katharina tunicata</i>)	Sea pen (<i>Ptilosaris gumey</i>)
Nudibrach (<i>Armina californica</i>)	Annelida
Purple olive (<i>Olivella biplicata</i>)	Polycheate worm (<i>Mesochaetopterus taylori</i>)
Wrinkled amphissa (<i>Amphissa columbiana</i>)	Northern feater duster worm (<i>Eudistylia vancouveri</i>)
Rock oyster (<i>Pododesmus macroschisma</i>)	Serpulid worm (<i>Serpula vermicularis</i>)
Gaper clam (<i>Tresus sp.</i>)	Angiosperms
Piddock (<i>Zirfaea pilisbryi</i>)	Eelgrass (<i>Zostera marina</i>)
Heart cockle (<i>Clinocardium nuttalli</i>)	Algae
Native littleneck clam (<i>Protothaca staminea</i>)	Navicula
Bay mussel (<i>Mytilus edulis</i>)	<i>Laminaria saccharina</i>
Horse mussel (<i>Mytilus edulis</i>)	<i>Nereocystis leutkeana</i>
Arthropoda	<i>Alaria marginata</i>
Northern kelp crab (<i>Pugettia producta</i>)	<i>Pterygophora californica</i>
Graceful kelp crab (<i>Pugettia gracilis</i>)	<i>Desmarestia ligulata</i>
Red rock crab (<i>Cancer productus</i>)	<i>Iridea cordata</i>
Coonstripe shrimp (<i>Pandalus danae</i>)	<i>Gigartina exasperata</i>
Acorn barnacle (<i>Balanus glandula</i>)	<i>Gracilaria sjoestedtii</i>
Echinodermata	<i>Ahnfeltiopsis pacifica</i>
Brittle star (<i>Ophiophteris papillosa</i>)	<i>Sarcodiotheca gaudichaudii</i>
Sunflower star (<i>Pycnopodia helianthoides</i>)	<i>Callophyllis sp.</i>
Rose star (<i>Crossaster papposus</i>)	<i>Opuntiella californica</i>
Sand star (<i>Luidia foliolata</i>)	<i>Delessaria decipiens</i>
False ochre sea star (<i>Evasterias troschelli</i>)	

Source: Buckley, undated

Table A-2. Checklist of Species found at Seacrest nearshore area
Site #2, 1996.

Fish	Arthropoda (continued)
Tubesnout (<i>Aulorhynchus flavidus</i>)	Red rock crab (<i>Cancer productus</i>)
Wolf-eel (<i>Anarrhichthys ocellatus</i>)	Graceful crab (<i>Cancer gracilis</i>)
Pacific herring (<i>Clupea harengus pallasi</i>)	Hermit crab (<i>Pagurus armatus</i>)
Brown rockfish (<i>Sebastes auriculatus</i>)	Coonstripe shrimp (<i>Pandalus danae</i>)
Copper rockfish (<i>Sebastes caurinus</i>)	Annelida
Quillback rockfish (<i>Sebastes maliger</i>)	Feather duster worm (<i>Eudistylia polymorpha</i>)
Lingcod (<i>Ophiodon elongatus</i>)	Polycheate (<i>Mesochaetopterus taylori</i>)
Whitespotted greenling (<i>Hexagrammos stelleri</i>)	Echinodermata
Sculpin (<i>Artedius sp.</i>)	Sunflower star (<i>Pcynopodi halianthoides</i>)
Buffalo sculpin (<i>Enophrys bison</i>)	Stimpson's sun star (<i>Solaster stimpsoni</i>)
Sailfin sculpin (<i>Nautichthys oculofasciatus</i>)	Rose star (<i>Crossaster papposus</i>)
Kelp perch (<i>Brachyistius frenatus</i>)	Sand star (<i>Luidia foliolata</i>)
Pile perch (<i>Rhacochilus vacca</i>)	False ochre star (<i>Pisaster ochraceus</i>)
Shiner perch (<i>Cymatogaster aggregata</i>)	Cushion star (<i>Pteraster tesselatus</i>)
Striped perch (<i>Embiotoca lateralis</i>)	California sea cucumber (<i>Parastichopus californicus</i>)
Speckled sanddab (<i>Citharichthys stigmaeus</i>)	Cnidaria
Rock sole (<i>Lepidotretta bilineata</i>)	White plumed anemone (<i>Metridium giganteum</i>)
C-O sole (<i>Pleuronichthys coenosus</i>)	White spotted rose anemone (<i>Urticina lofotensis</i>)
Mollusca	Sand-rose anemone (<i>Urticina columbiana</i>)
Giant Pacific octopus (<i>Octopus dofleini</i>)	Aggregating anemone (<i>Anthopleura elegantissima</i>)
Stubby squid (<i>Rossia pacifica</i>)	Water jellyfish (<i>Aeqorea aequorea</i>)
Market squid (<i>Loligo opalescens</i>)	Lion's mane jellyfish (<i>Cyanea capillata</i>)
Lewis' moon snail (<i>Polinices lewisi</i>)	Fleshy sea pen (<i>Ptilosarcus gurneyi</i>)
Gaper clam (<i>Tresus capax</i> or <i>nuttallii</i>)	Macro-algae
Bay mussel (<i>Mytilis edulis</i>)	<i>Navicula sp.</i>
Nudibrach (<i>Flabellina fusca</i>)	<i>Sargassum muticum</i>
False sea lemon (<i>Archidoris montereyensis</i>)	<i>Laminaria saccharina</i>
Arthropoda	<i>Sarcociotheca sp.</i>
Acorn barnacle (<i>Balanus glandula</i>)	<i>Callophyis flabellulata</i>
Northern kelp crab (<i>Pugettia producta</i>)	<i>Opuntiella californica</i>
Dungeness crab (<i>Cancer magister</i>)	

Appendix B

**Site #2 (Seacrest) : 1998 Pea Gravel and Control (Mud)
Plot Sampling Results**

 * SITE SUMMARY *

IDENTIFICATION 98AP30
 STATION DUWAMISH HEAD - MUD
 FROM SAMPLES E 6 E 7 E 8

SPECIES DEFINITION -

TRUNCATED = NO
 LH-STAGE = EGGNOT
 PARTS CODE EXCLUDED

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO AN AREA OF 1.0 SQUARE METERS

	MEAN	RANGE	S.D.	COEF.VAR
SAMPLE AREA (M**2)	.100	.100-	.000	.000
TOTAL WET WEIGHT (PER M**2)	.000	.000-	.000	.000
TOTAL ABUNDANCE (PER M**2)	24196.67	9720.00-	18223.09	.75
		44660.00		
SAMPLE WET WEIGHT (PER M**2)	.000	.000-	.000	.000
SAMPLE DRY WEIGHT (PER M**2)	.000	.000-	.000	.000

ORGANISM NAME	PARTS CODE	LH-STAGE	* NUMBERS/M**2			* WET WEIGHT,GRAMS/M**2			* AVG. BIOMASS			* PERCENTAGES		
			* TOTAL	MEAN	RANGE	S.D.	* TOTAL	MEAN	RANGE	S.D.	* MEAN	S.D.	* DANCE	BIO- MASS
Turbellaria	C		240.0	80.0	40.0 - 200.0	105.8	.000	.000	.000 - .000	.00	.0000	.0000	.33	.00
Nematoda	C		3630.0	1210.0	560.0 - 2300.0	949.8	.000	.000	.000 - .000	.00	.0000	.0000	5.00	.00
Polychaeta	AC		910.0	303.3	160.0 - 420.0	132.0	.000	.000	.000 - .000	.00	.0000	.0000	1.25	.00
Oligochaeta	AC		1060.0	353.3	190.0 - 590.0	209.8	.000	.000	.000 - .000	.00	.0000	.0000	1.46	.00
Gastropoda	7		90.0	30.0	10.0 - 80.0	43.6	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00
Littorina scutulata	+egg		1050.0	350.0	280.0 - 400.0	62.4	.000	.000	.000 - .000	.00	.0000	.0000	1.45	.00
Nudibranchia	7		100.0	33.3	100.0 - 100.0	57.7	.000	.000	.000 - .000	.00	.0000	.0000	.14	.00
Bivalvia	7		1160.0	386.7	80.0 - 1000.0	531.2	.000	.000	.000 - .000	.00	.0000	.0000	1.60	.00
Halacaridae	C		60.0	20.0	20.0 - 40.0	20.0	.000	.000	.000 - .000	.00	.0000	.0000	.08	.00
Podocopida	AC		230.0	76.7	80.0 - 150.0	75.1	.000	.000	.000 - .000	.00	.0000	.0000	.32	.00

EPIBENTHIC PLANKTON ANALYSIS

SITE TABLE, PAGE 2

IDENTIFICATION 98AP30
STATION DUWAMISH HEAD - MUD
FROM SAMPLES E 6 E 7 E 8

IDENTIFICATION 98AP30
 STATION DUWAMISH HEAD - MUD
 FROM SAMPLES E 6 E 7 E 8

ORGANISM NAME	PARTS CODE	LH-STAGE	*	NUMBERS/M**2			*	WET WEIGHT, GRAMS/M**2			*	AVG. BIOMASS		*	PERCENTAGES	
			*	TOTAL	MEAN	RANGE	S.D.	*	TOTAL	MEAN	RANGE	S.D.	*	MEAN	S.D.	*
<i>Stenelia peniculata</i> - HC		A	230.0	76.7	50.0 - 100.0		25.2	.000	.000	.000 - .000	.00	.0009	.0000	.32	.00	
<i>Typhlamphiascus pectinifer</i> - HC		A	2410.0	803.3	520.0 - 1300.0		431.5	.000	.000	.000 - .000	.00	.0000	.0000	3.32	.00	
<i>Mesochra</i> sp. 8		HC	10.0	3.3	10.0 - 10.0		5.8	.000	.000	.000 - .000	.00	.0000	.0000	.01	.00	
<i>Dactylopusia vulgaris</i> - HC		A	27520.0	9173.3	1420.0 - 21100.0	10482.8		.000	.000	.000 - .000	.00	.0000	.0000	37.91	.00	
<i>Dactylopusia crassipes</i> - HC		8	100.0	33.3	100.0 - 100.0		57.7	.000	.000	.000 - .000	.00	.0000	.0000	.14	.00	
<i>Dactylopusia paratiboides</i>		A HC	520.0	173.3	520.0 - 520.0		300.2	.000	.000	.000 - .000	.00	.0000	.0000	.72	.00	
<i>Paradactylopodia</i> sp. - HC		A	7880.0	2626.7	620.0 - 5700.0		2702.8	.000	.000	.000 - .000	.00	.0000	.0000	10.86	.00	
<i>Parathalestris californica</i>		8 HC	10.0	3.3	10.0 - 10.0		5.8	.000	.000	.000 - .000	.00	.0000	.0000	.01	.00	
<i>Diarthrodes</i> sp. - HC		A	460.0	153.3	120.0 - 200.0		41.6	.000	.000	.000 - .000	.00	.0000	.0000	.63	.00	
<i>Rhyncothalestris helgolandica</i>		8	40.0	13.3	40.0 - 40.0		23.1	.000	.000	.000 - .000	.00	.0000	.0000	.06	.00	
<i>Idomene purpurocincta</i>		8	40.0	13.3	40.0 - 40.0		23.1	.000	.000	.000 - .000	.00	.0000	.0000	.06	.00	
<i>Cyclopoida</i>		A	2110.0	703.3	430.0 - 1680.0		872.7	.000	.000	.000 - .000	.00	.0000	.0000	2.91	.00	
<i>Corycaeus anglicus</i>		A	110.0	36.7	30.0 - 80.0		40.4	.000	.000	.000 - .000	.00	.0000	.0000	.15	.00	
<i>Hemicyllops</i> sp.		F	100.0	33.3	100.0 - 100.0		57.7	.000	.000	.000 - .000	.00	.0000	.0000	.14	.00	
<i>Balanomorpha</i>		7E	850.0	283.3	80.0 - 600.0		277.9	.000	.000	.000 - .000	.00	.0000	.0000	1.17	.00	
<i>Cumella vulgaris</i>		7C	240.0	80.0	60.0 - 100.0		20.0	.000	.000	.000 - .000	.00	.0000	.0000	.33	.00	
<i>Munna ubiquita</i>		A	20.0	6.7	20.0 - 20.0		11.5	.000	.000	.000 - .000	.00	.0000	.0000	.03	.00	
<i>Epicaridea</i>		C	10.0	3.3	10.0 - 10.0		5.8	.000	.000	.000 - .000	.00	.0000	.0000	.01	.00	
<i>Ampithoe</i> sp.		7	70.0	3.3	10.0 - 10.0		5.8	.000	.000	.000 - .000	.00	.0000	.0000	.01	.00	
<i>Acorides</i> sp. - GA		7A	540.0	180.0	60.0 - 360.0		158.7	.000	.000	.000 - .000	.00	.0000	.0000	.74	.00	
<i>Pontogeneia</i> sp. cf <i>rostrata</i>		A	460.0	153.3	110.0 - 220.0		58.6	.000	.000	.000 - .000	.00	.0000	.0000	.63	.00	
<i>Desdimelitta desdichada</i>		A	30.0	10.0	10.0 - 20.0		10.0	.000	.000	.000 - .000	.00	.0000	.0000	.04	.00	
<i>Photis</i> sp.		A7	340.0	113.3	140.0 - 200.0		102.6	.000	.000	.000 - .000	.00	.0000	.0000	.47	.00	

EPIBENTHIC PLANKTON ANALYSIS

SITE TABLE, PAGE 4

IDENTIFICATION 98AP30
 STATION DUWAMISH HEAD - MUD
 FROM SAMPLES E 6 E 7 E 8

ORGANISM NAME	PARTS CODE	LH-STAGE	*	NUMBERS/M**2			*	WET WEIGHT, GRAMS/M**2			*	AVG. BIOMASS		*	PERCENTAGES		
			*	*	*	*	*	*	*	*	*	MEAN	S.D.	*	ABUN-	BIO-	
			*	TOTAL	MEAN	RANGE	S.D.	*	TOTAL	MEAN	RANGE	S.D.	*	MEAN	S.D.	*	DANCE
Gammaropsis sp.	G	A	2070.0	690.0	360.0 - 1200.0	448.0	.000	.000	.000 - .000	.00	.0000	.0000	2.85	.00			
Ischyrocerus sp.	I	A	40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.06	.00			
Americhelidium sp.	A	A	110.0	36.7	20.0 - 90.0	47.3	.000	.000	.000 - .000	.00	.0000	.0000	.15	.00			
Eobrolgus chumashi	E	A	340.0	113.3	40.0 - 240.0	110.2	.000	.000	.000 - .000	.00	.0000	.0000	.47	.00			
Pleustidae	P	8	10.0	3.3	10.0 - 10.0	5.8	.000	.000	.000 - .000	.00	.0000	.0000	.01	.00			
Pleustirus secorruis	P	A	70.0	23.3	30.0 - 40.0	20.8	.000	.000	.000 - .000	.00	.0000	.0000	.10	.00			
Caprellidae	C	7	60.0	20.0	10.0 - 50.0	26.5	.000	.000	.000 - .000	.00	.0000	.0000	.08	.00			
Mayerella banksia	M	A	10.0	3.3	10.0 - 10.0	5.8	.000	.000	.000 - .000	.00	.0000	.0000	.01	.00			
Hippolytidae	H	7	20.0	6.7	20.0 - 20.0	11.5	.000	.000	.000 - .000	.00	.0000	.0000	.03	.00			
Hippolyte clarki	H	C	10.0	3.3	10.0 - 10.0	5.8	.000	.000	.000 - .000	.00	.0000	.0000	.01	.00			
Eualus subtilis	E	7	10.0	3.3	10.0 - 10.0	5.8	.000	.000	.000 - .000	.00	.0000	.0000	.01	.00			
Crangon sp.	C	7	10.0	3.3	10.0 - 10.0	5.8	.000	.000	.000 - .000	.00	.0000	.0000	.01	.00			
Majidae	M	7	10.0	3.3	10.0 - 10.0	5.8	.000	.000	.000 - .000	.00	.0000	.0000	.01	.00			
Diptera-chironomidae	D	6	10.0	3.3	10.0 - 10.0	5.8	.000	.000	.000 - .000	.00	.0000	.0000	.01	.00			

TOTAL NUMBER OF PLANKTON CATEGORIES 70

SHANNON-WEINER DIVERSITY INDEX	NUMBERS	3.67
	BIOMASS	.00
BRILLOUIN-S DIVERSITY INDEX BASED ON NUMBERS		3.67

* SITE SUMMARY *

IDENTIFICATION 98AP30
 STATION DUWAMISH HEAD - GRAVEL
 FROM SAMPLES E 1 E 2 E 3

SPECIES DEFINITION -

TRUNCATED = NO

LH-STAGE = EGG/NOT

PARTS CODE EXCLUDED

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO AN AREA OF 1.0 SQUARE METERS

	MEAN	RANGE	S.D.	COEF.VAR
SAMPLE AREA (M**2)	.100	.100-	.000	.000
TOTAL WET WEIGHT (PER M**2)	.000	.000-	.000	.000
TOTAL ABUNDANCE (PER M**2)	11053.33	7680.00-	3252.60	.29
14170.00				
SAMPLE WET WEIGHT (PER M**2)	.000	.000-	.000	.000
SAMPLE DRY WEIGHT (PER M**2)	.000	.000-	.000	.000

ORGANISM NAME	* PARTS CODE	LH-STAGE	* NUMBERS/M**2			* TOTAL	* NET WEIGHT, GRAMS/M**2			* AVG. BIOMASS			* PERCENTAGES		
			* TOTAL	MEAN	RANGE		S.D.	* TOTAL	MEAN	RANGE	S.D.	* MEAN	S.D.	DANCE	BIO- MASS
Turbellaria	C		40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00	
Nematoda	C		200.0	66.7	40.0 - 80.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.60	.00	
Polychaeta	C		200.0	66.7	80.0 - 120.0	61.1	.000	.000	.000 - .000	.00	.0000	.0000	.60	.00	
Polynoidae	7		40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00	
Gastropoda	7		40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00	
Littorina scutulata	+egg		1320.0	440.0	320.0 - 600.0	144.2	.000	.000	.000 - .000	.00	.0000	.0000	3.98	.00	
Nudibranchia	7		40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00	
Bivalvia	7		200.0	66.7	40.0 - 80.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.60	.00	
Podocopida	C		160.0	53.3	40.0 - 80.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.48	.00	
Calanus sp.	F		120.0	40.0	40.0 - 80.0	40.0	.000	.000	.000 - .000	.00	.0000	.0000	.36	.00	

EPIBENTHIC PLANKTON ANALYSIS

SITE TABLE, PAGE 2

IDENTIFICATION 98AP30
 STATION DUWAMISH HEAD - GRAVEL
 FROM SAMPLES E 1 E 2 E 3

ORGANISM NAME PARTS CODE	LH-STAGE	* NUMBERS/M**2			* WET WEIGHT, GRAMS/M**2			* AVG. BIOMASS			* PERCENTAGES		
		* * *			* * *			* * *			* * *		
		TOTAL	MEAN	RANGE	S.D.	TOTAL	MEAN	RANGE	S.D.	MEAN	S.D.	DANCE	BIO- MASS
Paracalanus sp. A		120.0	40.0	40.0 - 80.0	40.0	.000	.000	.000 - .000	.00	.0000	.0000	.36	.00
Microcalanus sp. A		200.0	66.7	200.0 - 200.0	115.5	.000	.000	.000 - .000	.00	.0000	.0000	.60	.00
Stephos pacificus A		2000.0	666.7	960.0 - 1040.0	578.7	.000	.000	.000 - .000	.00	.0000	.0000	6.03	.00
Harpacticoidae HC F		40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00
Tegastidae HC 8		40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00
Ectinosomatidae HC A		1760.0	586.7	520.0 - 640.0	61.1	.000	.000	.000 - .000	.00	.0000	.0000	5.31	.00
Harpacticus sp. F		40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00
Harpacticus compressus HC 8		40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00
Harpacticus sp.-obscurus group A		640.0	213.3	160.0 - 280.0	61.1	.000	.000	.000 - .000	.00	.0000	.0000	1.93	.00
Zaus sp. AB		160.0	53.3	40.0 - 120.0	61.1	.000	.000	.000 - .000	.00	.0000	.0000	.48	.00
Tisbe sp. HC A		4680.0	1560.0	1040.0 - 2120.0	541.1	.000	.000	.000 - .000	.00	.0000	.0000	14.11	.00
Scutellidium hippolytes HC 8		40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00
Danielssenia sp. 8		40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00
Laophontidae HC F		40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00
Paralaophonte pacifica HC A		80.0	26.7	80.0 - 80.0	46.2	.000	.000	.000 - .000	.00	.0000	.0000	.24	.00
Paralaophonte perplexa HC A		480.0	160.0	40.0 - 280.0	120.0	.000	.000	.000 - .000	.00	.0000	.0000	1.45	.00
Enhydrosoma sp. 8		80.0	26.7	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.24	.00
Amonardia perturbata HC A		280.0	93.3	80.0 - 120.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.84	.00
Diosaccus spinatus HC A		1360.0	453.3	120.0 - 720.0	305.5	.000	.000	.000 - .000	.00	.0000	.0000	4.10	.00
Amphiascopsis cinctus A		240.0	80.0	40.0 - 200.0	105.8	.000	.000	.000 - .000	.00	.0000	.0000	.72	.00
Stenelia peniculata HC A		240.0	80.0	80.0 - 160.0	80.0	.000	.000	.000 - .000	.00	.0000	.0000	.72	.00
Typhlamphiascus pectinifer A		480.0	160.0	120.0 - 200.0	40.0	.000	.000	.000 - .000	.00	.0000	.0000	1.45	.00
Amphiascoides sp. A		40.0	13.3	40.0 - 40.0	23.1	.000	.000	.000 - .000	.00	.0000	.0000	.12	.00

EPIBENTHIC PLANKTON ANALYSIS

SITE TABLE, PAGE 3

IDENTIFICATION 98AP30
STATION DUWAMISH HEAD - GRAVEL
FROM SAMPLES E 1 E 2 E 3

ORGANISM NAME	*	NUMBERS/M**2			*	WET WEIGHT, GRAMS/M**2			*	AVG. BIOMASS		*	PERCENTAGES			
	*	*	*	*	*	*	*	*	*	MEAN	S.D.	*	ABUN-	BIO-		
PARTS CODE	LH-STAGE	TOTAL	MEAN	RANGE	S.D.	*	TOTAL	MEAN	RANGE	S.D.	*	MEAN	S.D.	*	DANCE	BIO- MASS
<i>Amphiascoptes</i> sp. a	17c 8A	80.0	26.7	40.0 - 40.0	23.1	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.24	.00	
<i>Mesochra</i> sp.	Hc A	80.0	26.7	80.0 - 80.0	46.2	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.24	.00	
<i>Thalestridae</i>	Hc F	160.0	53.3	160.0 - 160.0	92.4	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.48	.00	
<i>Dactylopusia vulgaris</i>	Hc A	7040.0	2346.7	1600.0 - 3720.0	1190.9	.	.000	.000	.000 - .000	.00	.0000	.0000	.	21.23	.00	
<i>Paradactylopodia</i> sp.	Hc A	1240.0	413.3	320.0 - 560.0	128.6	.	.000	.000	.000 - .000	.00	.0000	.0000	.	3.74	.00	
<i>Parathalestris</i> sp. a	Hc 8	40.0	13.3	40.0 - 40.0	23.1	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.12	.00	
<i>Diarthrodes</i> sp.	Hc A	1080.0	360.0	120.0 - 600.0	240.0	.	.000	.000	.000 - .000	.00	.0000	.0000	.	3.26	.00	
<i>Rhyncothalestris helgolandica</i>	8	40.0	13.3	40.0 - 40.0	23.1	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.12	.00	
<i>Cyclopoida</i>	A	1440.0	480.0	320.0 - 800.0	277.1	.	.000	.000	.000 - .000	.00	.0000	.0000	.	4.34	.00	
<i>Corycaeus anglicus</i>	A	360.0	120.0	80.0 - 160.0	40.0	.	.000	.000	.000 - .000	.00	.0000	.0000	.	1.09	.00	
<i>Balanomorpha</i>	E7	680.0	226.7	120.0 - 440.0	184.8	.	.000	.000	.000 - .000	.00	.0000	.0000	.	2.05	.00	
<i>Cumella vulgaris</i>	A	80.0	26.7	40.0 - 40.0	23.1	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.24	.00	
<i>Munna ubiquita</i>	C	40.0	13.3	40.0 - 40.0	23.1	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.12	.00	
<i>Gammaridea</i>	7	240.0	80.0	240.0 - 240.0	138.6	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.72	.00	
<i>Aoroides</i> sp.	7C	90.0	30.0	10.0 - 80.0	43.6	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.27	.00	
<i>Pontogeneia</i> sp. cf <i>rostrata</i>	A	330.0	110.0	80.0 - 130.0	26.5	.	.000	.000	.000 - .000	.00	.0000	.0000	.	1.00	.00	
<i>Photis</i> sp.	7	40.0	13.3	40.0 - 40.0	23.1	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.12	.00	
<i>Gammaropsis</i> sp.	A	4300.0	1433.3	280.0 - 2620.0	1170.4	.	.000	.000	.000 - .000	.00	.0000	.0000	.	12.97	.00	
<i>Ischyrocerus</i> sp.	A	80.0	26.7	80.0 - 80.0	46.2	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.24	.00	
<i>Oedicerotidae</i>	7	40.0	13.3	40.0 - 40.0	23.1	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.12	.00	
<i>Eobrolgus chumashi</i>	A	50.0	16.7	50.0 - 50.0	28.9	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.15	.00	
<i>Pleusirus secorru</i> s	A	40.0	13.3	40.0 - 40.0	23.1	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.12	.00	
<i>Mayerella banksia</i>	C	110.0	36.7	30.0 - 80.0	40.4	.	.000	.000	.000 - .000	.00	.0000	.0000	.	.33	.00	

EPIBENTHIC PLANKTON ANALYSIS

SITE TABLE, PAGE 4

IDENTIFICATION 98AP30
STATION DUWAMISH HEAD - GRAVEL
FROM SAMPLES E 1 E 2 E 3

TOTAL NUMBER OF PLANKTON CATEGORIES 56

SHANNON-WEINER DIVERSITY INDEX NUMBERS 4.13
BIOMASS .00
BRILLOUIN-S DIVERSITY INDEX BASED ON NUMBERS 4.13

* FRACTION SUMMARY *

IDENTIFICATION 98AP30

TIDE STAGE - NOT GIVEN

STATION DUWAMISH HEAD - GRAVEL

TIDE HEIGHT .0 METERS

SAMPLE E 1

COLLECTION TIME 1410 PST

SPECIES DEFINITION -

TRUNCATED = NO

LH-STAGE = EGGNOT

PARTS CODE EXCLUDED

SAMPLE AREA = .1000 SQUARE METERS (M**2)

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO A SAMPLE FRACTION OF .0250 SQUARE METERS

GEAR TYPE 62 (.1 M**2 plankton pump - 253u mesh net fraction of 3 nets)

FRACTION WET WEIGHT = .0000 / .0250 M**2

FRACTION DRY WEIGHT = .0000 / .0250 M**2

ORGANISM CODE	- NAME	LIFE HISTORY STAGE		PARTS CODE	COUNT — WET WT,GMS (PER SAMPLE FRACTION)	COUNT — WET WT,GMS (PER M**2)
3901	- Turbellaria	C			1. .000	40. .000
47	- Nematoda	C			2. .000	80. .000
5001	- Polychaeta	C			2. .000	80. .000
51	- Gastropoda	7			1. .000	40. .000
5103100104	- Littorina scutulata	+egg			8. .000	320. .000
5127	- Nudibranchia	7			1. .000	40. .000
55	- Bivalvia	7			2. .000	80. .000
6113	- Podocopida	C			2. .000	80. .000
61180401	- Paracalanus sp.	A			2. .000	80. .000
61180504	- Microcalanus sp.	A			5. .000	200. .000
611909	- Ectinosomatidae	A			13. .000	520. .000
61191001	- Harpacticus sp.	F			1. .000	40. .000
6119100108	- Harpacticus compressus	8			1. .000	40. .000
6119100194	- Harpacticus sp.-obscurus group	A			5. .000	200. .000
61191002	- Zaus sp.	A			3. .000	120. .000
61191301	- Tisbe sp.	A			53. .000	2120. .000
6119150104	- Paralaophonte perplexa	A			7. .000	280. .000
61192704	- Enhydrosoma sp.	8			1. .000	40. .000
6119280102	- Amonardia perturbata	A			3. .000	120. .000
6119280201	- Diosaccus spinatus	A			18. .000	720. .000
6119280301	- Amphiascopis cinctus	A			5. .000	200. .000
6119280905	- Stenelia peniculata	A			2. .000	80. .000
6119281002	- Typhlamphiascus pectinifer	A			4. .000	160. .000
6119281299	- Amphiascoides sp. a	B			1. .000	40. .000
61192903	- Mesochra sp.	A			2. .000	80. .000
611931	- Thalestridae	F			4. .000	160. .000
6119310102	- Dactylopusia vulgaris	A			93. .000	3720. .000
61193102	- Paradactylopodia sp.	A			14. .000	560. .000

EPIBENTHIC PLANKTON ANALYSIS

FRACTION TABLE, PAGE 2

 IDENTIFICATION 98AP30
 STATION DUWAMISH HEAD - GRAVEL
 SAMPLE E 1

TIDE STAGE - NOT GIVEN
 TIDE HEIGHT .0 METERS
 COLLECTION TIME 1410 PST

ORGANISM CODE	NAME	LIFE HISTORY STAGE	PARTS	COUNT — WET WT,GMS	COUNT — WET WT,GMS
			CODE	(PER SAMPLE FRACTION)	(PER M**2)
6119310399	- Parathalestris sp. a	8		1. .000	.40. .000
61193104	- Diarthrodes sp.	A		15. .000	600. .000
6120	- Cyclopoida	A		20. .000	800. .000
6120040101	- Corycaeus anglicus	A		2. .000	80. .000
6134	- Balanomorpha	E7		11. .000	440. .000
6154080102	- Cumella vulgaris	A		1. .000	40. .000
6169	- Gammaridea	7		6. .000	240. .000
6169201299	- Pontogeneia sp. cf rostrata	A		3. .000	130. .000
61692604	- Gammaropsis sp.	A		35. .000	1400. .000
61692702	- Ischyrocerus sp.	A		2. .000	80. .000
6171010301	- Mayerella banksia	C		2. .000	80. .000
TOTAL				354. .000	14170. .000

* FRACTION SUMMARY *

IDENTIFICATION 98AP30
STATION DUWAMISH HEAD - GRAVEL
SAMPLE E 2

TIDE STAGE - NOT GIVEN
TIDE HEIGHT .0 METERS
COLLECTION TIME 1422 PST

SPECIES DEFINITION -

TRUNCATED = NO
LH-STAGE = EGGRNOT
PARTS CODE EXCLUDED

SAMPLE AREA = .1000 SQUARE METERS (M**2)
ABUNDANCES AND WEIGHTS ARE ADJUSTED TO A SAMPLE FRACTION OF .0250 SQUARE METERS

GEAR TYPE 62 (.1 M**2 plankton pump - 253u mesh net fraction of 3 nets)

FRACTION WET WEIGHT = .0000 / .0250 M**2
FRACTION DRY WEIGHT = .0000 / .0250 M**2

ORGANISM CODE	- NAME	LIFE HISTORY STAGE		PARTS CODE	COUNT — WET WT,GMS (PER SAMPLE FRACTION)	COUNT — WET WT,GMS (PER M**2)
47	- Nematoda	C			2. .000	80. .000
500102	- Polynoidae	7			1. .000	40. .000
5103100104	- Littorina scutulata	+egg			15. .000	600. .000
55	- Bivalvia	7			2. .000	80. .000
6113	- Podocopida	C			1. .000	40. .000
61180102	- Calanus sp.	F			1. .000	40. .000
61180401	- Paracalanus sp.	A			1. .000	40. .000
6118120299	- Stephos pacificus	A			24. .000	960. .000
611909	- Ectinosomatidae	A			15. .000	600. .000
6119100194	- Harpacticus sp.-obscurus group	A			7. .000	280. .000
61191301	- Tisbe sp.	A			38. .000	1520. .000
611915	- Laophontidae	F			1. .000	40. .000
6119150103	- Paralaophonte pacifica	A			2. .000	80. .000
6119150104	- Paralaophonte perplexa	A			4. .000	160. .000
61192704	- Enhydrosoma sp.	8			1. .000	40. .000
6119280102	- Amonardia perturbata	A			2. .000	80. .000
6119280201	- Diosaccus spinatus	A			13. .000	520. .000
6119280301	- Amphiascopis cinctus	A			1. .000	40. .000
6119281002	- Typhlamphiascus pectinifer	A			3. .000	120. .000
61192812	- Amphiascoidea sp.	A			1. .000	40. .000
6119281299	- Amphiascoidea sp. a	A			1. .000	40. .000
6119310102	- Dactylopusia vulgaris	A			40. .000	1600. .000
61193102	- Paradactylopodia sp.	A			8. .000	320. .000
61193104	- Diarthrodes sp.	A			9. .000	360. .000
6120	- Cyclopoida	A			8. .000	320. .000
6120040101	- Corycaeus anglicus	A			4. .000	160. .000
6134	- Balanomorpha	E			3. .000	120. .000
6154080102	- Cumella vulgaris	A			1. .000	40. .000

EPIBENTHIC PLANKTON ANALYSIS

FRACTION TABLE, PAGE 2

IDENTIFICATION 98AP30
 STATION DUWAMISH HEAD - GRAVEL
 SAMPLE E 2

TIDE STAGE - NOT GIVEN
 TIDE HEIGHT .0 METERS
 COLLECTION TIME 1422 PST

ORGANISM CODE	- NAME	LIFE HISTORY STAGE	PARTS CODE	COUNT — WET WT,GMS	COUNT — WET WT,GMS
				(PER SAMPLE FRACTION)	(PER M**2)
61690602	- Aoroides sp.	7		2. .000	.80. .000
6169201299	- Pontogeneia sp. cf rostrata	A		3. .000	120. .000
61692604	- Gammaropsis sp.	A		66. .000	2620. .000
616937	- Oedicerotidae	7		1. .000	40. .000
6169420999	- Eobrolgus chumashi	A		1. .000	50. .000
6169430701	- Pleusirus secorrus	A		1. .000	40. .000
TOTAL				283. .000	11310. .000

* FRACTION SUMMARY *

IDENTIFICATION 98AP30

STATION DUWAMISH HEAD - GRAVEL

SAMPLE E 3

TIDE STAGE - NOT GIVEN

TIDE HEIGHT .0 METERS

COLLECTION TIME 1435 PST

SPECIES DEFINITION -

TRUNCATED = NO

LH-STAGE = EGGNOT

PARTS CODE EXCLUDED

SAMPLE AREA = .1000 SQUARE METERS (M**2)

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO A SAMPLE FRACTION OF .0250 SQUARE METERS

GEAR TYPE 62 (.1 M**2 plankton pump - 253u mesh net fraction of 3 nets)

FRACTION WET WEIGHT = .0000 / .0250 M**2

FRACTION DRY WEIGHT = .0000 / .0250 M**2

ORGANISM CODE	NAME	LIFE HISTORY STAGE		PARTS CODE	COUNT — WET WT,GMS (PER SAMPLE FRACTION)	COUNT — WET WT,GMS (PER M**2)
		C	+egg			
47	- Nematoda	C			1. .000	40. .000
5001	- Polychaeta	C			3. .000	120. .000
5103100104	- Littorina scutulata	+egg			10. .000	400. .000
55	- Bivalvia	7			1. .000	40. .000
6113	- Podocopida	C			1. .000	40. .000
61180102	- Calanus sp.	F			2. .000	80. .000
6118120299	- Stephos pacificus	A			26. .000	1040. .000
6119	- Harpacticoida	F			1. .000	40. .000
611902	- Tegastidae	8			1. .000	40. .000
611909	- Ectinosomatidae	A			16. .000	640. .000
6119100194	- Harpacticus sp.-obscurus group	A			4. .000	160. .000
61191002	- Zaus sp.	8			1. .000	40. .000
61191301	- Tisbe sp.	A			26. .000	1040. .000
6119130201	- Scutellidium hippolytes	8			1. .000	40. .000
61191404	- Danielssenia sp.	8			1. .000	40. .000
6119150104	- Paralaophonte perplexa	A			1. .000	40. .000
6119280102	- Amonardia perturbata	A			2. .000	80. .000
6119280201	- Diosaccus spinatus	A			3. .000	120. .000
6119280905	- Stenhelbia peniculata	A			4. .000	160. .000
6119281002	- Typhlamphiascus pectinifer	A			5. .000	200. .000
6119310102	- Dactylopusia vulgaris	A			43. .000	1720. .000
61193102	- Paradactylopodia sp.	A			9. .000	360. .000
61193104	- Diarthrodes sp.	A			3. .000	120. .000
6119310701	- Rhyncothalestris helgolandica	8			1. .000	40. .000
6120	- Cyclopoida	A			8. .000	320. .000
6120040101	- Corycaeus anglicus	A			3. .000	120. .000
6134	- Balanomorpha	E			3. .000	120. .000
6163120103	- Munna ubiquita	C			1. .000	40. .000

EPIBENTHIC PLANKTON ANALYSIS

FRACTION TABLE, PAGE 2

IDENTIFICATION 98AP30
 STATION DUWAMISH HEAD - GRAVEL
 SAMPLE E 3

TIDE STAGE - NOT GIVEN
 TIDE HEIGHT .0 METERS
 COLLECTION TIME 1435 PST

ORGANISM CODE	NAME	LIFE HISTORY STAGE		PARTS CODE	COUNT — WET WT,GMS (PER SAMPLE FRACTION)	COUNT — WET WT,GMS (PER M**2)
61690602	- Aoroides sp.		C		0. .000	10. .000
6169201299	- Pontogeneia sp. cf rostrata		A		2. .000	80. .000
61692602	- Photis sp.		7		1. .000	40. .000
61692604	- Gammaropsis sp.		A		7. .000	280. .000
6171010301	- Mayerella banksia		C		1. .000	30. .000
TOTAL					192. .000	7680. .000

Appendix C

**Site #2 (Seacrest) : 1999 Pea Gravel and Control (Mud)
Plot Sampling Results**

EPIBENTHIC PLANKTON ANALYSIS

FRACTION TABLE, PAGE 1

* FRACTION SUMMARY *

IDENTIFICATION 99MY24
STATION DUWAMISH HEAD MUD
SAMPLE E 1

TIDE STAGE . NOT GIVEN
TIDE HEIGHT .0 METERS
COLLECTION TIME 0 PST

SPECIES DEFINITION -
TRUNCATED = NO
LH-STAGE = EGGORNOT
PARTS CODE EXCLUDED

SAMPLE AREA = .1000 SQUARE METERS (M**2)
ABUNDANCES AND WEIGHTS ARE ADJUSTED TO A STANDARD SAMPLE OF .0250 SQUARE METERS

GEAR TYPE 62 (.1 M**2 plankton pump - 253u mesh net fraction of 3 nets)

FRACTION WET WEIGHT = .0000 / .0250 M**2
FRACTION DRY WEIGHT = .0000 / .0250 M**2

ORGANISM CODE	NAME	LIFE HISTORY STAGE	PARTS CODE	COUNT ---	WET WT, GMS (PER STANDARD SAMPLE)	COUNT ---	WET WT, GMS (PER M**2)
51	- Gastropoda	7		1.	.000	50.	.000
55	- Bivalvia	7		1.	.000	50.	.000
6118	- Calanoida	F2		3.	.000	100.	.000
61180505	- Pseudocalanus sp.	A		12.	.000	490.	.000
6118120299	- Stephos pacificus	A		9.	.000	350.	.000
61190301	- Porcellidium sp.	8		0.	.000	10.	.000
6119100194	- Harpacticus sp.-obscurus group	A		4.	.000	150.	.000
61191301	- Tisbe sp.	A		114.	.000	4570.	.000
6119280201	- Dirosaccus spinatus	A		2.	.000	{ 80.	.000
611931	- Thalestridae	F		5.	.000	200.	.000
6119310102	- Dactylopodida vulgaris	8		21.	.000	850.	.000
6119310105	- Dactylopodida paratisboides	8		6.	.000	250.	.000
61193102	- Paradactylopodida sp.	8		5.	.000	200.	.000
61193104	- Diarthrodes sp.	A		1.	.000	50.	.000
6119310701	- Rhyncothalestris helgolandica	8		3.	.000	100.	.000
6119311214	- Idomenea purpurocincta	8		3.	.000	100.	.000
612014	- Cyclopiniidae	A		5.	.000	200.	.000
6134	- Balanomorpha	72E		7.	.000	260.	.000
6169030202	- Amphilochus littoralis	A		1.	.000	50.	.000
61690602	- Aoroides sp.	7		0.	.000	10.	.000
6169201299	- Pontogeneia sp. cf rostrata	7		1.	.000	20.	.000
61692702	- Ischyrocerus sp.	7		1.	.000	50.	.000
6169371402	- Synchelidium shoemakeri	7		1.	.000	30.	.000
6169420602	- Parametophoxus fultoni	C		1.	.000	50.	.000
6174	- Euphausiacea	6		0.	.000	10.	.000
6179160499	- Eualus subtilis	C		0.	.000	10.	.000
TOTAL				207.	.000	8290.	.000

EPIBENTHIC PLANKTON ANALYSIS

FRACTION TABLE, PAGE 1

* FRACTION SUMMARY *

IDENTIFICATION 99MY24
STATION DUWAMISH HEAD MUD
SAMPLE E 2

TIDE STAGE - NOT GIVEN
TIDE HEIGHT .0 METERS
COLLECTION TIME 0 PST

SPECIES DEFINITION -

TRUNCATED = NO
LH-STAGE = EGGORNOT
PARTS CODE EXCLUDED

SAMPLE AREA = .1000 SQUARE METERS (M**2)
ABUNDANCES AND WEIGHTS ARE ADJUSTED TO A STANDARD SAMPLE OF .0250 SQUARE METERS

GEAR TYPE 62 (.1 M**2 plankton pump - 253u mesh net fraction of 3 nets)

FRACTION WET WEIGHT = .0000 /.0250 M**2
FRACTION DRY WEIGHT = .0000 /.0250 M**2

ORGANISM CODE	NAME	LIFE HISTORY		PARTS CODE	COUNT --- WET WT, GMS (PER STANDARD SAMPLE)	COUNT --- WET WT, GMS (PER M**2)
		STAGE				
5001	- Polychaeta	C			1. .000	50. .000
51	Gastropoda	7			1. .000	20. .000
5103100104	- Littorina scutulata	--egg			3. .000	100. .000
55	- Bivalvia	7			1. .000	30. .000
6113	- Podocopida	C			1. .000	20. .000
61180102	- Calanus sp.	F			1. .000	30. .000
61180401	- Paracalanus sp.	A			3. .000	100. .000
61180505	- Pseudocalanus sp.	A			13. .000	510. .000
6118120299	- Stephos pacificus	A			2. .000	80. .000
6118170101	- Centropages abdominalis	F			0. .000	10. .000
6118290103	- Acartia longiremis	8			1. .000	40. .000
6118290199	- Acartia (Acartiura) spp.	A			2. .000	60. .000
6118300101	- Tortanus discaudatus	F			1. .000	20. .000
611909	- Ectinosomatidae	A			3. .000	120. .000
6119100194	- Harpacticus sp.-obscurus group	A			1. .000	40. .000
61191002	- Zaus sp.	F			1. .000	20. .000
61191301	- Tisbe sp.	A			58. .000	2300. .000
6119150108	- Paralaophonte hyperborea	8			1. .000	40. .000
61191802	- Ameira sp.	8			1. .000	20. .000
611931	- Thalestridae	F			9. .000	360. .000
6119310102	- Dactylopodia vulgaris	8			21. .000	820. .000
61193102	- Paradactylopodia sp.	8			2. .000	60. .000
61193104	- Diarthrodes sp.	8			1. .000	20. .000
6119310701	- Rhyncothalestris helgolandica	8			1. .000	40. .000
6119311214	- Idomene purpurocincta	8			2. .000	60. .000
6120	- Cyclopoida	8			1. .000	20. .000
612014	- Cyclopiniidae	A			3. .000	120. .000
612099	- Poecilostomatoidea	A			3. .000	120. .000
6134	- Balanomorpha	72E			15. .000	610. .000
6169201299	- Pontogeneia sp. cf rostrata	7			0. .000	10. .000
6169211008	- Melita desdichada	7			1. .000	20. .000
6169420601	- Metaphoxus frequens	7			0. .000	10. .000
6174	- Euphausiacea	2			1. .000	40. .000
999999999	- Unidentified	6			1. .000	20. .000
TOTAL					149. .000	5940. .000

EPIBENTHIC PLANKTON ANALYSIS

FRACTION TABLE, PAGE 1

 * FRACTION SUMMARY *

IDENTIFICATION 99MY24
 STATION DUWAMISH HEAD MUD
 SAMPLE E 3

TIDE STAGE - NOT GIVEN
 TIDE HEIGHT .0 METERS
 COLLECTION TIME 0 PST

SPECIES DEFINITION -

TRUNCATED = NO
 LH-STAGE = EGGORNOT
 PARTS CODE EXCLUDED

SAMPLE AREA = .1000 SQUARE METERS (M**2)
 ABUNDANCES AND WEIGHTS ARE ADJUSTED TO A STANDARD SAMPLE OF .0250 SQUARE METERS

GEAR TYPE 62 (.1 M**2 plankton pump - 253u mesh net fraction of 3 nets)

FRACTION WET WEIGHT = .0000 / .0250 M**2
 FRACTION DRY WEIGHT = .0000 / .0250 M**2

ORGANISM CODE	NAME	LIFE HISTORY		PARTS CODE	COUNT ---	WET WT, GMS (PER STANDARD SAMPLE)	COUNT ---	WET WT, GMS (PER M**2)
		STAGE						
3701	- Hydrozoa	C			1.	.000	20.	.000
5001	- Polychaeta	C			9.	.000	350.	.000
51	- Gastropoda	7			3.	.000	110.	.000
5103100104	- Littorina scutulata	--egg			2.	.000	60.	.000
55	- Bivalvia	7			2.	.000	90.	.000
6118	- Calanoida	2F			3.	.000	120.	.000
61180102	- Calanus sp.	F			3.	.000	100.	.000
61180505	- Pseudocalanus sp.	A			9.	.000	350.	.000
6118120299	- Stephos pacificus	A			2.	.000	80.	.000
6118290103	- Acartia longiremis	A			0.	.000	10.	.000
611909	- Ectinosomatidae	A			4.	.000	140.	.000
6119100194	- Harpacticus sp.-obscurus group	A			2.	.000	80.	.000
61191301	- Tisbe sp.	A			76.	.000	3040.	.000
61191404	- Danielssenia sp.	F			1.	.000	20.	.000
6119150108	- Paralaophonte hyperborea	8			1.	.000	20.	.000
61191507	- Normanella sp.	8			1.	.000	20.	.000
61191602	- Ameira sp.	8			1.	.000	20.	.000
6119280102	- Amonardia perturbata	8			1.	.000	40.	.000
61192802	- Diosaccus sp.	8			1.	.000	20.	.000
6119280201	- Diosaccus spinatus	8			0.	.000	10.	.000
6119280301	- Amphiascopis cinctus	8			1.	.000	40.	.000
6119280905	- Stenhelia peniculata	8			1.	.000	20.	.000
6119281002	- Typhlamphiascus pectinifer	8			1.	.000	40.	.000
6119281299	- Amphiascoidea sp. a	8			1.	.000	20.	.000
61192906	- Orthopssyllus sp.	8			1.	.000	20.	.000
611931	- Thalestridae	F			10.	.000	380.	.000
6119310102	- Dactylopodia vulgaris	8			22.	.000	860.	.000
6119310701	- Rhyncothalestris helgolandica	8			1.	.000	20.	.000
6119999999	- Ambunguipes rufocincta	8			1.	.000	20.	.000
61200899	- Euryte sp.	8			1.	.000	40.	.000
612014	- Cyclopiniidae	8			1.	.000	40.	.000
6134	- Balanomorpha	72E			16.	.000	640.	.000
6154080102	- Cumella vulgaris	7			1.	.000	20.	.000
6163120103	- Munna ubiquita	7			1.	.000	30.	.000
6169030202	- Amphilochus littoralis	A			0.	.000	10.	.000
61690401	- Ampithoe sp.	7			0.	.000	10.	.000
61690602	- Aoroides sp.	/			0.	.000	10.	.000
6169371402	- Synchelidium shoemakeri	7			2.	.000	60.	.000
6169421999	- Eobrolgus chumashi	A			1.	.000	20.	.000
6171	- Caprellidea	7			0.	.000	10.	.000
6174	- Euphausiacea	--egg			4.	.000	160.	.000
6174	- Euphausiacea	2			1.	.000	20.	.000
TOTAL					180.	.000	7190.	.000

EPIBENTHIC PLANKTON ANALYSIS

FRACTION TABLE, PAGE 1

* FRACTION SUMMARY *

IDENTIFICATION	99MY24	TIDE STAGE	- NOT GIVEN
STATION	DUWAMISH HEAD GRAVEL	TIDE HEIGHT	.0 METERS
SAMPLE	E 1	COLLECTION TIME	0 PST

SPECIES DEFINITION -

TRUNCATED = NO
 LH-STAGE = EGGORNOT
 PARTS CODE EXCLUDED

SAMPLE AREA = .1000 SQUARE METERS (M**2)
 ABUNDANCES AND WEIGHTS ARE ADJUSTED TO A STANDARD SAMPLE OF .0250 SQUARE METERS

GEAR TYPE 62 (.1 M**2 plankton pump - 253u mesh net fraction of 3 nets)

FRACTION WET WEIGHT = .0000 /.0250 M**2
 FRACTION DRY WEIGHT = .0000 /.0250 M**2

ORGANISM CODE	NAME	LIFE HISTORY	PARTS STAGE	COUNT ---	WET WT,GMS (PER STANDARD SAMPLE)	COUNT ---	WET WT,GMS (PER M**2)
5001	- Polychaeta	C		1.	.000	30.	.000
5103100104	- Littorina scutulata	+egg		1.	.000	30.	.000
55	- Bivalvia	7		5.	.000	200.	.000
61180102	- Calanus sp.	F		1.	.000	20.	.000
61180401	- Paracalanus sp.	A		3.	.000	100.	.000
6118120299	- Stephos pacificus	A		8.	.000	300.	.000
61190201	- Tegastes sp.	8		38.	.000	1500.	.000
611909	- Ectinosomatidae	A		5.	.000	200.	.000
6119100194	- Harpacticus sp.-obscurus group	A		3.	.000	100.	.000
61191301	- Tisbe sp.	A		274.	.000	10950.	.000
6119150108	- Paralaophonte hyperborea	8		8.	.000	300.	.000
611920	- Dirosaccidae	8		3.	.000	100.	.000
6119280102	- Amonardia perturbata	A		5.	.000	200.	.000
6119280201	- Dirosaccus spinatus	A		4.	.000	140.	.000
6119280301	- Amphiascopsis cinctus	A		6.	.000	220.	.000
6119281002	- Typhlamphiascus pectinifer	A		3.	.000	100.	.000
611931	- Thalestridae	F		135.	.000	5400.	.000
6119310102	- Dactylopodia vulgaris	8		648.	.000	25900.	.000
61193104	- Diarthrodes sp.	8		8.	.000	300.	.000
612014	- Cyclopidae	A		15.	.000	600.	.000
6134	- Balanomorpha	7E		2.	.000	70.	.000
61450101	- Nebalia sp.	C		0.	.000	10.	.000
6153	- Mysidacea-mysida	7		1.	.000	20.	.000
6154010105	- Lamprops quadriplicata	7		0.	.000	10.	.000
6169030202	- Amphilochus littoralis	7		0.	.000	10.	.000
61690602	- Aoroides sp.	7		9.	.000	370.	.000
6169201299	- Pontogenia sp. cf rostrata	7		2.	.000	60.	.000
61692604	- Gammaropsis sp.	A		25.	.000	990.	.000
61692702	- Ischyrocerus sp.	7		7.	.000	270.	.000
6169371402	- Synchelidium shoemakeri	A		1.	.000	20.	.000
616943	- Pleustidae	7		0.	.000	10.	.000
6174	- Euphausiacea	2		3.	.000	100.	.000
617916	- Hippolytidae	7		1.	.000	30.	.000
6179221499	- Mesocarangon munitella	7		0.	.000	10.	.000
TOTAL				1217.	.000	48670.	.000

EPIBENTHIC PLANKTON ANALYSIS

FRACTION TABLE, PAGE 1

 * FRACTION SUMMARY *

IDENTIFICATION 99MY24
 STATION DUWAMISH HEAD GRAVEL
 SAMPLE E 2

TIDE STAGE - NOT GIVEN
 TIDE HEIGHT .0 METERS
 COLLECTION TIME 0 PST

SPECIES DEFINITION -

TRUNCATED = NO
 LH-STAGE = EGGORNOT
 PARTS CODE EXCLUDED

SAMPLE AREA = .1000 SQUARE METERS (M**2)

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO A STANDARD SAMPLE OF .0250 SQUARE METERS

GEAR TYPE 62 (.1 M**2 plankton pump - 253u mesh net fraction of 3 nets)

FRACTION WET WEIGHT = .0000 /.0250 M**2
 FRACTION DRY WEIGHT = .0000 /.0250 M**2

CODE	ORGANISM - NAME	LIFE HISTORY		PARTS CODE	COUNT --- WET WT, GMS (PER STANDARD SAMPLE)	COUNT --- WET WT, GMS (PER M**2)
		STAGE				
5001	- Polychaeta	C			2. .000	80. .000
51	- Gastropoda	7			2. .000	80. .000
5103100104	- Littorina scutulata	++-egg			5. .000	200. .000
593001	- Halacaridae	C			1. .000	40. .000
6113	- Podocopida	C			1. .000	40. .000
6118	- Calanoida	2			4. .000	160. .000
61180102	- Calanus sp.	F			2. .000	90. .000
61180505	- Pseudocalanus sp.	A			13. .000	520. .000
6118120299	- Stephos pacificus	A			17. .000	680. .000
6118170101	- Centropages abdominalis	8			0. .000	10. .000
6118290103	- Acartia longiremis	8			0. .000	10. .000
6119	- Harpacticoida	F			1. .000	40. .000
61190201	- Tegastes sp.	8			1. .000	40. .000
611911	- Peltidiidae	8			0. .000	10. .000
61191301	- Tisbe sp.	A			49. .000	1960. .000
6119150108	- Paralaophonte hyperborea	A			4. .000	160. .000
6119180202	- Ameira longipes	8			1. .000	40. .000
6119280102	- Amonardia perturbata	A			2. .000	90. .000
6119280201	- Diosaccus spinatus	A			3. .000	120. .000
611931	- Thalestridae	F			20. .000	800. .000
6119310102	- Dactylopodia vulgaris	8			95. .000	3800. .000
61193102	- Paradactylopodia sp.	8			1. .000	40. .000
6119310701	- Rhyncothalestris helgolandica	8			1. .000	40. .000
6120	- Cyclopoida	8			0. .000	10. .000
6134	- Balanomorpha	2E7			15. .000	600. .000
616306	- Janiridae	C			1. .000	40. .000
61690602	- Aercides sp.	7			0. .000	10. .000
6169201299	- Pontogeneia sp. cf rostrata	A			0. .000	10. .000
61692702	- Ischyrocerus sp.	7			0. .000	10. .000
6169371402	- Synchelidium shoemakeri	A			0. .000	10. .000
6174	- Euphausiacea	++-egg			8. .000	320. .000
6174	- Euphausiacea	2			1. .000	40. .000
6179160499	- Eualus subtilis	C			0. .000	10. .000
TOTAL					253. .000	10110. .000

EPIBENTHIC PLANKTON ANALYSIS

FRACTION TABLE, PAGE 1

 * FRACTION SUMMARY *

IDENTIFICATION 99MY24
 STATION DUWAMISH HEAD GRAVEL
 SAMPLE E 3

TIDE STAGE - NOT GIVEN
 TIDE HEIGHT .0 METERS
 COLLECTION TIME 0 PST

SPECIES DEFINITION -
 TRUNCATED = NO
 LH-STAGE = EGGORNOT
 PARTS CODE EXCLUDED

SAMPLE AREA = 1000 SQUARE METERS (M**2)
 ABUNDANCES AND WEIGHTS ARE ADJUSTED TO A STANDARD SAMPLE OF .0250 SQUARE METERS

GEAR TYPE 62 (.1 M**2 plankton pump - 253u mesh net fraction of 3 nets)

FRACTION WET WEIGHT = .0000 / .0250 M**2
 FRACTION DRY WEIGHT = .0000 / .0250 M**2

ORGANISM CODE	NAME	LIFE HISTORY STAGE	PARTS CODE	COUNT	--- WET WT,GMS (PER STANDARD SAMPLE)	COUNT	--- WET WT,GMS (PER M**2)
				---	---	---	---
5001	- Polychaeta	C		5.	.000	190.	.000
5103100104	- Littorina scutulata	+egg		14.	.000	560.	.000
593001	- Halacaridae	C		3.	.000	100.	.000
6113	- Podocopida	C		13.	.000	500.	.000
6118	- Calanoida	F		3.	.000	100.	.000
61180102	- Calanus sp.	F		4.	.000	150.	.000
61180505	- Pseudocalanus sp.	A		5.	.000	200.	.000
6118120299	- Stephos pacificus	A		3.	.000	100.	.000
61190301	- Porcellidium sp.	8		5.	.000	200.	.000
6119100194	- Harpacticus sp.-obscurus group	A		3.	.000	100.	.000
611911	- Peltidiidae	8		1.	.000	20.	.000
61191301	- Tisbe sp.	A		283.	.000	11300.	.000
6119150108	- Paralaophonte hyperborea	A		10.	.000	400.	.000
6119280201	- Dirosaccus spinatus	A		9.	.000	370.	.000
61192804	- Amphiascus sp.	8		3.	.000	100.	.000
611931	- Thalestridae	F		28.	.000	1100.	.000
6119310102	- Dactylopodida vulgaris	8		158.	.000	6300.	.000
612014	- Cyclopidae	A		20.	.000	800.	.000
6134	- Balanomorpha	72E		89.	.000	3550.	.000
6153	- Mysidacea-mysida	7		1.	.000	20.	.000
6154080102	- Cumella vulgaris	8		0.	.000	10.	.000
61690602	- Aoroides sp.	7		0.	.000	10.	.000
6169201299	- Pontogeneia sp. cf rostrata	7		3.	.000	120.	.000
6169211008	- Melita desdichada	7		0.	.000	10.	.000
61692604	- Gammaropsis sp.	7		1.	.000	20.	.000
61692702	- Ischyrocerus sp.	7		4.	.000	140.	.000
6169420602	- Parametaphoxus fultoni	C		0.	.000	10.	.000
6169421999	- Eobrolgus chumashi	7		0.	.000	10.	.000
61694305	- Pleusytmus sp.	7		0.	.000	10.	.000
6171	- Caprellidea	7		0.	.000	10.	.000
6174	- Euphausiacea	2		8.	.000	300.	.000
617916	- Hippolytidae	C		1.	.000	20.	.000
TOTAL				671.	.000	26830.	.000

EPIBENTHIC PLANKTON ANALYSIS

SITE TABLE, PAGE 1

 * SITE SUMMARY *

IDENTIFICATION 99MY24
 STATION DUWAMISH HEAD MUD
 FROM SAMPLES E 1 E 2 E 3

SPECIES DEFINITION -
 TRUNCATED = NO
 LH-STAGE = EGG/NOT
 PARTS CODE EXCLUDED

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO AN AREA OF 1.0 SQUARE METERS

ORGANISM NAME	PARTS CODE	LH-STAGE	TOTAL	MEAN	RANGE	S.D.	* COEF.VAR	* NUMBERS/M**2	* WET WEIGHT, GRAMS/M**2	* AVG. BIOMASS *	PERCENTAGES	
Hydrozoa	C	20.0	6.7	20.0	-	11.5	.000	.000	.00	.0000	.0000	.09 .00
N. Polychaeta	C	400.0	133.3	50.0	-	189.3	.000	.000	.000	.0000	.0000	1.87 .00
Gastropoda	7	180.0	60.0	20.0	-	45.8	.000	.000	.000	.0000	.0000	.84 .00
Littorina scutulata	+egg	160.0	53.3	60.0	-	50.3	.000	.000	.000	.0000	.0000	.75 .00

EPIBENTHIC PLANKTON ANALYSIS

SITE TABLE, PAGE 2

IDENTIFICATION 99MY24

STATION DUWAMISH HEAD MUD
FROM SAMPLES E 1 E 2 E 3

ORGANISM NAME	PARTS CODE	LH-STAGE	TOTAL	MEAN	RANGE	S.D.	* TOTAL	MEAN	RANGE	S.D.	* MEAN	* S.D.	* DANCE	* AVG. BIOMASS	* PERCENTAGES	
														BIO-ABUN-	BIO-MASS	
Bivalvia	7		170.0	56.7	30.0 - 90.0	.6	30.6	.000	.000 -	.00	.0000	.0000	.79	.79	.00	
Poecopoda	C		20.0	6.7	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.09	.09	.00	
Calanoida	F2		220.0	73.3	100.0 - 120.0	.3	.64	.000	.000 -	.00	.0000	.0000	1.03	1.03	.00	
Calanus sp.	F		130.0	43.3	30.0 -	51.3	.000	.000	.000 -	.00	.0000	.0000	.61	.61	.00	
Paracalanus sp.	A		100.0	33.3	100.0 -	.7	.57	.000	.000 -	.00	.0000	.0000	.47	.47	.00	
Pseudocalanus sp.	A		1350.0	450.0	350.0 -	.2	.87	.000	.000 -	.00	.0000	.0000	6.30	6.30	.00	
Stephos pacificus	A		510.0	170.0	80.0 - 350.0	.9	155.9	.000	.000 -	.00	.0000	.0000	2.38	2.38	.00	
Centropages abdominalis	F		10.0	3.3	10.0 -	.8	.000	.000	.000 -	.00	.0000	.0000	.05	.05	.00	
Acartia longiremis	F		50.0	16.7	10.0 - 40.0	.8	20.8	.000	.000 -	.00	.0000	.0000	.23	.23	.00	
Acartia (Acartiura) spp.	A		60.0	20.0	60.0 -	.6	.34	.000	.000 -	.00	.0000	.0000	.28	.28	.00	
Toxitanus discaudatus	F		20.0	6.7	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.09	.09	.00	
Porcellidiidae	8															
Ectinosomatidae	A		260.0	86.7	120.0 -	.7	.75	.000	.000 -	.00	.0000	.0000	1.21	1.21	.00	
Harpacticus sp.-obscurus group	A		270.0	90.0	40.0 - 150.0	.7	.55	.000	.000 -	.00	.0000	.0000	1.26	1.26	.00	
Zaus sp.	F		20.0	6.7	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.09	.09	.00	

EPIENTHIC PLANKTON ANALYSIS

SITE TABLE PAGE 3

IDENTIFICATION 99MY24

STATION	EPDM SAMPLES	DUWAMISH HEAD MUD
	E 1 E 2 E 3	

ORGANISM NAME	PARTS CODE	LH-STAGE	TOTAL	MEAN	RANGE	S.D.	TOTAL	MEAN	RANGE	S.D.	MEAN	S.D.	WET WEIGHT, GRAMS/M* ²	AVG. BIOMASS/M* ²	* PERCENTAGES
Tisbe sp.	A		9910.0	3303.3	2300.0 -	1157.7	.000	.000	.000 -	.00	.0000	.0000	46.27	.00	
Danielssenia sp.	F		20.0	6.7	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.09	.00	
Paralaoiphonte sp.			60.0	20.0	20.0 -	20.0	.000	.000	.000 -	.00	.0000	.0000	.28	.00	
Laoiphontidae	8		20.0	6.7	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.09	.00	
Amelira sp.	8		40.0	13.3	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.19	.00	
Amcanardia perturbata	8		40.0	13.3	40.0 -	23.1	.000	.000	.000 -	.00	.0000	.0000	.19	.00	
Diosaccus sp.	8		20.0	6.7	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.09	.00	
Diosaccus spinatus	8		90.0	30.0	10.0 -	43.6	.000	.000	.000 -	.00	.0000	.0000	.42	.00	
Amphiascopsis cinctrus	A8		40.0	13.3	40.0 -	23.1	.000	.000	.000 -	.00	.0000	.0000	.19	.00	
Stenohelia peniculata	8		20.0	6.7	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.09	.00	
Typhlamphiascus pectinifer	8		40.0	13.3	40.0 -	23.1	.000	.000	.000 -	.00	.0000	.0000	.19	.00	
Amphiascoidea sp. a	8		20.0	6.7	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.09	.00	
Canthocamptidae	8		20.0	6.7	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.09	.00	
Thalestridae			940.0	313.3	200.0 -	98.7	.000	.000	.000 -	.00	.0000	.0000	4.39	.00	
Dactylopusia vulgaris	F		2530.0	843.3	820.0 -	20.8	.000	.000	.000 -	.00	.0000	.0000	11.81	.00	

EPIBENTHIC PLANKTON ANALYSIS

SITE TABLE, PAGE 4

IDENTIFICATION 99MY24

STATION DUWAMISH HEAD MUD
FROM SAMPLES E 1 E 2 E 3

ORGANISM NAME	PARTS CODE	LH-STAGE	TOTAL	MEAN	RANGE	S.D.	* TOTAL	MEAN	RANGE	S.D.	* MEAN	* S.D.	* DANCE	* AVG. BIOMASS	* PERCENTAGES
							NUMBERS/M*	* M**/2	WET WEIGHT, GRAMS/M**2	* ABUN-	BIO-				
Dactylopusia paratisboides	8	250.0	83.3	250.0 -	144.3	.000	.000	.000 -	.00	.0000	.0000	.1.17	.00		
Paradactylopodia sp.	8	260.0	86.7	250.0 -	102.6	.000	.000	.000 -	.00	.0000	.0000	1.21	.00		
Diarthrodes sp.	A8	70.0	23.3	200.0 -	25.2	.000	.000	.000 -	.00	.0000	.0000	.33	.00		
Rhyncothalalestris helgolandica	8	160.0	53.3	20.0 -	41.6	.000	.000	.000 -	.00	.0000	.0000	.75	.00		
Idiomene purpurocincta	8	160.0	53.3	100.0 -	50.3	.000	.000	.000 -	.00	.0000	.0000	.75	.00		
Amblyunguipes rufocincta	8	20.0	6.7	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.09	.00		
Cyclopoida	8	20.0	6.7	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.09	.00		
Euryte sp.	8	40.0	13.3	40.0 -	23.1	.000	.000	.000 -	.00	.0000	.0000	.19	.00		
Cyclopiniidae	A8	360.0	120.0	40.0 -	80.0	.000	.000	.000 -	.00	.0000	.0000	1.68	.00		
Cyclopoida	A	120.0	40.0	120.0 -	69.3	.000	.000	.000 -	.00	.0000	.0000	.56	.00		
Balanomorpha	72E	1510.0	503.3	260.0 -	211.3	.000	.000	.000 -	.00	.0000	.0000	7.05	.00		
Cumella vulgaris	7	20.0	6.7	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.09	.00		
Mulina ubiquita	7	30.0	10.0	30.0 -	17.3	.000	.000	.000 -	.00	.0000	.0000	.14	.00		
Amphiochus littoralis	A	60.0	20.0	10.0 -	26.5	.000	.000	.000 -	.00	.0000	.0000	.28	.00		
Ampithoe sp.	7	10.0	3.3	10.0 -	5.8	.000	.000	.000 -	.00	.0000	.0000	.05	.00		

EPIBENTHIC PLANKTON ANALYSIS

SITE TABLE, PAGE 5

IDENTIFICATION 99MY24

STATION FROM SAMPLES	DUWAMISH	HEAD	MUD
	E 1	E 2	E 3

SHANNON - WEINER DIVERSITY INDEX	NUMBERS	3 . 31
BRIOLLOUIN - S DIVERSITY INDEX	BIO MASS	. 00
BASED ON NUMBERS		3 . 30

IDENTIFICATION 99MY24
STATION DUWAMISH HEAD GRAVEL
FROM SAMPLES E 1 E 2 E 3

SPECIES DEFINITION -
 TRUNCATED = NO
 LH-STAGE = EGGOR
 PARTS CODE EXCLUDE

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO AN AREA OF 1.0 SQUARE METERS

EPIBENTHIC PLANKTON ANALYSIS

IDENTIFICATION 99MY24
 STATION DUWAMISH HEAD GRAVEL
 FROM SAMPLES E 1 E 2 E 3

ORGANISM NAME	PARTS CODE	LH-STAGE	TOTAL	MEAN	RANGE	S.D.	* TOTAL	* MEAN	RANGE	S.D.	* MEAN	S.D.	* AVG. BIOMASS	* PERCENTAGES ABUN-	* DANCE	BIO- MASS
Halacaridae	C		140.0	46.7	40.0 - 100.0	.00	50.3	.000	.000 - .000	.00	.000	.000	.0000	.0000	.16	.00
Poecopoda	C		540.0	180.0	40.0 - 500.0	.00	277.8	.000	.000 - .000	.00	.000	.000	.0000	.0000	.63	.00
Calanoida	2F		260.0	86.7	100.0 - 160.0	.00	80.8	.000	.000 - .000	.00	.000	.000	.0000	.0000	.30	.00
Calanus sp.	F		260.0	86.7	20.0 - 150.0	.00	65.1	.000	.000 - .000	.00	.000	.000	.0000	.0000	.30	.00
Paracalanus sp.	A		100.0	33.3	100.0 - 100.0	.00	57.7	.000	.000 - .000	.00	.000	.000	.0000	.0000	.12	.00
Pseudocalanus sp.	A		720.0	240.0	200.0 - 520.0	.00	262.3	.000	.000 - .000	.00	.000	.000	.0000	.0000	.84	.00
Stephos pacificus	A		1080.0	360.0	100.0 - 680.0	.00	294.6	.000	.000 - .000	.00	.000	.000	.0000	.0000	1.26	.00
Centropages abdominalis	A		10.0	3.3	10.0 - 10.0	.00	5.8	.000	.000 - .000	.00	.000	.000	.0000	.0000	.01	.00
8																
Acartia longiremis	8		10.0	3.3	10.0 - 10.0	.00	5.8	.000	.000 - .000	.00	.000	.000	.0000	.0000	.01	.00
Harpacticoida	F		40.0	13.3	40.0 - 40.0	.00	23.1	.000	.000 - .000	.00	.000	.000	.0000	.0000	.05	.00
Tetastes sp.	8		1540.0	513.3	40.0 - 1500.0	.00	854.7	.000	.000 - .000	.00	.000	.000	.0000	.0000	1.80	.00
Porcellidiidae	8		200.0	66.7	200.0 - 200.0	.00	115.5	.000	.000 - .000	.00	.000	.000	.0000	.0000	.23	.00
Ectiinosomatidae	A		200.0	66.7	200.0 - 200.0	.00	115.5	.000	.000 - .000	.00	.000	.000	.0000	.0000	.23	.00
Harpacticus sp.-obscurus group	A		200.0	66.7	100.0 - 100.0	.00	57.7	.000	.000 - .000	.00	.000	.000	.0000	.0000	.23	.00
Peltidiidae	8		30.0	10.0	10.0 - 20.0	.00	10.0	.000	.000 - .000	.00	.000	.000	.0000	.0000	.04	.00
Tisbe sp.	A		24210.0	8070.0	1960.0 - 11300.0	.00	5294.3	.000	.000 - .000	.00	.000	.000	.0000	.0000	28.28	.00
Paralaophonte sp.	8A		860.0	286.7	160.0 - 400.0	.00	120.6	.000	.000 - .000	.00	.000	.000	.0000	.0000	1.00	.00

EPIBENTHIC PLANKTON ANALYSIS

IDENTIFICATION STATION FROM SAMPLES 99MY24 DUWAMISH HEAD GRAVEL

ORGANISM NAME	PARTS CODE	LH-STAGE	* TOTAL	MEAN	RANGE	S.D.	* TOTAL	MEAN	RANGE	S.D.	* MEAN	S.D.	* MEAN	S.D.	* AVG.	BIOMASS	* ABUN-	DANCE	MASS	PERCENTAGES
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ameira longipes			40.0	13.3	40.0 -	23.1	.000	.000	.000 -	.00	.0000	.0000	.00	.0000	.0000	.05	.05	.00	.00	
Diosaccidae	8		100.0	33.3	100.0 -	57.7	.000	.000	.000 -	.00	.0000	.0000	.12	.00	.00	.00	.00	.00	.00	
Amorpha perturbata			290.0	96.7	90.0 -	100.2	.000	.000	.000 -	.00	.0000	.0000	.34	.00	.00	.00	.00	.00	.00	
Diosuccus spinatus	A		630.0	210.0	120.0 -	138.9	.000	.000	.000 -	.00	.0000	.0000	.74	.00	.00	.00	.00	.00	.00	
Amphiascopsis cinctus	A		220.0	73.3	220.0 -	127.0	.000	.000	.000 -	.00	.0000	.0000	.26	.00	.00	.00	.00	.00	.00	
Amphiascus sp.			100.0	33.3	100.0 -	57.7	.000	.000	.000 -	.00	.0000	.0000	.12	.00	.00	.00	.00	.00	.00	
Typhlamphiascus pectinifer	A		100.0	33.3	100.0 -	57.7	.000	.000	.000 -	.00	.0000	.0000	.12	.00	.00	.00	.00	.00	.00	
Thalestridae			7300.0	2433.3	800.0 -	2573.6	.000	.000	.000 -	.00	.0000	.0000	.8.53	.00	.00	.00	.00	.00	.00	
Dactylcupusia vulgaris	F		36000.0	12000.0	3800.0 -	12102.5	.000	.000	.000 -	.00	.0000	.0000	.42.05	.00	.00	.00	.00	.00	.00	
Paracadytopodia sp.			40.0	13.3	40.0 -	23.1	.000	.000	.000 -	.00	.0000	.0000	.05	.00	.00	.00	.00	.00	.00	
Diarthrodes sp.			300.0	100.0	300.0 -	173.2	.000	.000	.000 -	.00	.0000	.0000	.35	.00	.00	.00	.00	.00	.00	
Rhynctothalestris helgolandica			40.0	13.3	40.0 -	23.1	.000	.000	.000 -	.00	.0000	.0000	.05	.00	.00	.00	.00	.00	.00	
Cyclopoidida			10.0	3.3	10.0 -	5.8	.000	.000	.000 -	.00	.0000	.0000	.01	.00	.00	.00	.00	.00	.00	
Cyclipinidae			1400.0	466.7	600.0 -	416.3	.000	.000	.000 -	.00	.0000	.0000	1.64	.00	.00	.00	.00	.00	.00	
Balaromorpha	A		4220.0	1406.7	800.0	70.0 -	1875.0	.000	.000	.000 -	.00	.0000	.0000	4.93	.00	.00	.00	.00	.00	
Rehalia sp.		7E2	10.0	3.3	10.0 -	5.8	.000	.000	.000 -	.00	.0000	.0000	.01	.00	.00	.00	.00	.00	.00	
Myiicacea-mysida	C		40.0	13.3	20.0 -	11.5	.000	.000	.000 -	.00	.0000	.0000	.05	.00	.00	.00	.00	.00	.00	

EPIBENTHIC PLANKTON ANALYSIS

SITE TABLE, PAGE 4

IDENTIFICATION STATION FROM SAMPLES

STATION	DUWAMISH HEAD	GRAVEL
FROM SAMPLES	E 1 E 2 E 3	

S9MY24

ORGANISM NAME	PARTS CODE	LH-STAGE	TOTAL	MEAN	RANGE	S.D.	TOTAL	MEAN	RANGE	S.D.	* MEAN	* S.D.	* WET WEIGHT, GRAMS/M**2	* AVG.	BIO-MASS	PERCENTAGES
													NUMBERS/M***2	*	*	
Lamprops quadruplicata			10.0	3.3	10.0 -	.5.8	.000	.000	.000 -	.00	.0000	.0000	.0000	.01	.00	
Cunella vulgaris	8		10.0	3.3	10.0 -	.5.8	.000	.000	.000 -	.00	.0000	.0000	.0000	.01	.00	
Janiidae	C	-	40.0	13.3	40.0 -	.23.1	.000	.000	.000 -	.00	.0000	.0000	.0000	.05	.00	
Amphiochus littoralis	7		10.0	3.3	10.0 -	.5.8	.000	.000	.000 -	.00	.0000	.0000	.0000	.01	.00	
Aoroides sp.	7		390.0	130.0	10.0 -	.207.8	.000	.000	.000 -	.00	.0000	.0000	.0000	.46	.00	
Pontogeneia sp. cf rostrata	7A		190.0	63.3	10.0 -	.55.1	.000	.000	.000 -	.00	.0000	.0000	.0000	.22	.00	
Melita desdichada	7		10.0	3.3	10.0 -	.5.8	.000	.000	.000 -	.00	.0000	.0000	.0000	.01	.00	
Gammareopsis sp.	A7		1010.0	336.7	20.0 -	.565.9	.000	.000	.000 -	.00	.0000	.0000	.0000	.1.18	.00	
Ischyrocerus sp.	7		420.0	140.0	10.0 -	.130.0	.000	.000	.000 -	.00	.0000	.0000	.0000	.49	.00	
Syichelidium shoemakeri	30.0		10.0	10.0	10.0 -	.10.0	.000	.000	.000 -	.00	.0000	.0000	.0000	.04	.00	
Parametophoxus fultoni	A		10.0	3.3	10.0 -	.5.8	.000	.000	.000 -	.00	.0000	.0000	.0000	.01	.00	
Eorolagus chumashi	C		10.0	3.3	10.0 -	.5.8	.000	.000	.000 -	.00	.0000	.0000	.0000	.01	.00	
Pleustidae	7		10.0	3.3	10.0 -	.5.8	.000	.000	.000 -	.00	.0000	.0000	.0000	.01	.00	
Pleusomytes so.	7		10.0	3.3	10.0 -	.5.8	.000	.000	.000 -	.00	.0000	.0000	.0000	.01	.00	
Caprellidea	7		10.0	3.3	10.0 -	.5.8	.000	.000	.000 -	.00	.0000	.0000	.0000	.01	.00	
Euphausiacea	+ - egg		320.0	106.7	320.0 -	.184.8	.000	.000	.000 -	.00	.0000	.0000	.0000	.37	.00	
Euphausiacea	2		440.0	146.7	40.0 -	.136.1	.000	.000	.000 -	.00	.0000	.0000	.0000	.51	.00	

EPIBENTHIC PLANKTON ANALYSIS

IDENTIFICATION
STATION 99MY24
DUWAMISH HEAD GRAVEL
FROM SAMPLES E 1 E 2 E 3

ORGANISM NAME	PARTS CODE	LH-STAGE *	TOTAL	MEAN	RANGE	S.D.	* TOTAL	MEAN	RANGE	S.D.	* MEAN	S.D.	* AVG. BIOMASS	* PERCENTAGES
Hippolytidae	7C		50.0	16.7	20.0 - 30.0	15.3	.000	.000	.000 - .000	.00	.000	.000	.000	.00
Euculus subtilis	C		10.0	3.3	10.0 - 10.0	5.8	.000	.000	.000 - .000	.00	.000	.000	.000	.00
Mesocrangon munitella	7		10.0	3.3	10.0 - 10.0	5.8	.000	.000	.000 - .000	.00	.000	.000	.000	.00
TOTAL NUMBER OF PLANKTON CATEGORIES	0		58											
SHANNON-WEINER DIVERSITY INDEX					NUMBERS									
BRILLOUIN-S DIVERSITY INDEX BASED ON NUMBERS					BIOMASS									

2.74
.00
2.74

* * * SITE SUMMARY *

IDENTIFICATION 99MY24
STATION DUWAMISH HEAD MUD
FROM SAMPLES E 1 E 2 E 3

SPECIES DEFINITION -
TRUNCATED = YES, BY 6
LH-STAGE = EGGORNO
PARTS CODE EXCLUDED

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO AN AREA OF 1.0 SQUARE METERS

	MEAN	RANGE	S.D.	COEF. VAR
	*	*	*	*
SAMPLE AREA (M**2)	.100	.100- .000	.000	.000
TOTAL WET WEIGHT (PER M**2)	.000	.000- .000	.000	.000
TOTAL ABUNDANCE (PER M**2)	7140.00	5940.00- 8290.00	1175.80	.16
SAMPLE WET WEIGHT (PER M**2)	.000	.000- .000	.000	.000
SAMPLE DRY WEIGHT (PER M**2)	.000	.000- .000	.000	.000

	MEAN	RANGE	S.D.	COEF. VAR
	*	*	*	*
ORGANISM NAME	*	NUMBERS/M**2	*	WET WEIGHT, GRAMS/M**2
PARTS CODE	LH-STAGE *	TOTAL	MEAN	RANGE
	*	*	*	S.D.
Hyircoza	C	20.0	6.7	20.0- 20.0
Polychaeta	C	400.0	133.3	50.0- 350.0
Gastropoda		180.0	60.0	20.0- 110.0
Mesogastropoda	+ egg	160.0	53.3	60.0- 100.0
Bivalvia		170.0	56.7	30.0- 90.0
Poecopida	C	20.0	6.7	20.0- 20.0
Cilioida	AF28	2450.0	816.7	660.0- 940.0

IDENTIFICATION 99MY24
STATION DUWAMISH HEAD MUD
FROM SAMPLES E 1 E 2 E 3

**SHANNON - WEINER DIVERSITY INDEX
BRITTON-LINTON'S DIVERSITY INDEX BASED ON NUMBERS
BIOMASS**

* SITE SUMMARY *

IDENTIFICATION 99MY24
STATION DUWAMISH HEAD GRAVEL
FROM SAMPLES E 1 E 2 E 3

SPECIES DEFINITION -
TRUNCATED = YES, BY 6
LH-STAGE = EGGORNOT
PARTS CODE EXCLUDED

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO AN AREA OF 1.0 SQUARE METERS

ORGANISM NAME PARTS CODE	LH-STAGE *	TOTAL	MEAN	RANGE	S.D.	COEF.VAR	* NUMBERS/M*2	* WET WEIGHT, GRAMS/M*2	* AVG. BIOMASS	* PERCENTAGES					
											* MEAN	S.D.	* MEAN	S.D.	* ABUN-
Polychaeta	C	300.0	100.0	30.0 - 190.0	.81.9	.000	.000	.000 - .000	.00	.0000	.0000	.00	.00	.35	.00
Gastropoda	7	80.0	26.7	80.0 - 80.0	.46.2	.000	.000	.000 - .000	.00	.0000	.0000	.09	.00	.09	.00
Mesogastropoda	+egg	790.0	263.3	30.0 - 560.0	.270.6	.000	.000	.000 - .000	.00	.0000	.0000	.92	.00	.92	.00
Bivalvia	7	200.0	66.7	200.0 - 200.0	.115.5	.000	.000	.000 - .000	.00	.0000	.0000	.23	.00	.23	.00
Halacaridae	C	140.0	46.7	40.0 - 100.0	.50.3	.000	.000	.000 - .000	.00	.0000	.0000	.16	.00	.16	.00
Poecopida	C	540.0	180.0	40.0 - 500.0	.277.8	.000	.000	.000 - .000	.00	.0000	.0000	.63	.00	.63	.00
Calanoida	AF28	2440.0	813.3	420.0 - 1470.0	.572.4	.000	.000	.000 - .000	.00	.0000	.0000	.285	.00	.285	.00

IDENTIFICATION 99MY24
STATION DUWAMISH HEAD GRAVEL
FROM SAMPLES E 1 E 2 E 3

TOTAL NUMBER OF PLANKTON CATEGORIES 19

SHANNON - WEINER DIVERSITY INDEX	NUMBERS	1.07
BRIOLLOUIN - S DIVERSITY INDEX BASED ON NUMBERS	BIOMASS	.00
		1.07